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Improved Patent Projectiles.

The shot and shell herewith illustrated, embrace several novel features in their construction and manufacture. Figs. 1 and 2 represents sub-caliber shot and shell. In manufacturing them a great portion of the boring and turning usually done on projectiles is avoided and they are, beyond the absolutely necessary parts, all made in the foundry. The shell the halved jackets, C C. The operation of this apparatus is to open after leaving the muzzle of the gun. The wings, then resisted by the atmosphere, break off and leave the shot to continue on its course unimpeded by them. It is as economically constructed as any of the other shot, and the inventor says that experiments have proved that its flight is true.

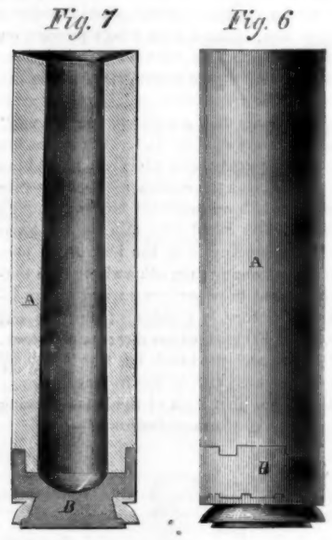
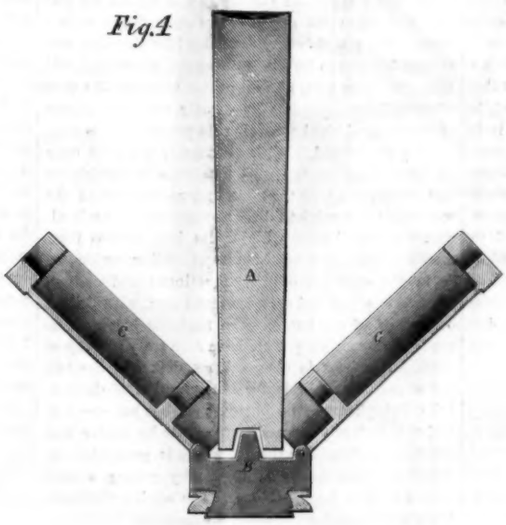


Fig. 7

Fig. 6



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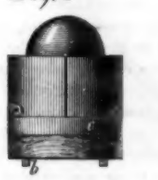

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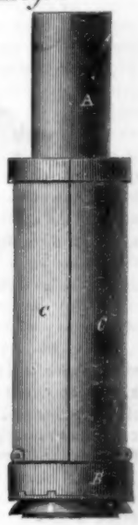


Fig. 5

Fig. 9

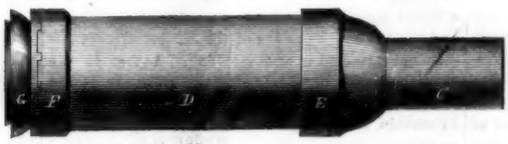


Fig. 3

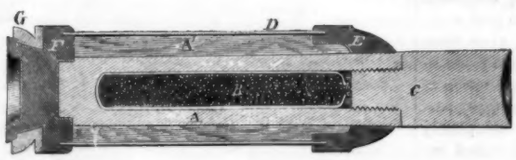


Fig. 1

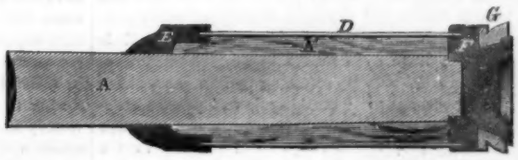


Fig. 2

SMITH'S PATENT SUB-CALIBER PROJECTILES.

Fig. 1 is made from a steel bar, A, bored out for the reception of the bursting charge contained in the case, B; the end of this cylindrical chamber is furnished with a thread into which the plug, C, is screwed tightly. The exterior casing, D, is made of sheet-iron, one-eight of an inch in thickness, and is secured in position by the caps, E and F. These caps are cast on by a process not necessary to describe here, and the interior of the sheet-iron case is filled with a resinous cement, A'. The brass cap, G, which expands into the rifle grooves is also cast on, and the shell is ready for use. The shot, Fig 2, is similarly constructed. No time fuse or friction tube is needed in this shell, as the percussion generates sufficient heat, when passing through iron plates, to fire the charges. Fig. 3 is an elevation of the same shot. Fig. 4 and 5 are views of a singular-looking sub-caliber shot; they consist of the steel bolts, A, bored out at the base for the reception of the cone formed on the cap, B. To this cap there are hinged

Figs. 6 and 7 are shot intended for piercing angulated armor and for attacking batteries plated with railroad iron. They are steel bolts, A, cupped out at the forward end, and are in effect hollow punches propelled by powder; a large portion of the substance of the shot being removed in order, the inventor says, to lessen the weight. The base, B, is attached in the same manner as all the others. Figs. 8 and 9 are sub-caliber shot, intended for the largest navy guns. They are fitted with the hinged jackets already described, and have a wooden sabot, *a*, fastened to the back end by the tap bolts, *b*. The shot, less in diameter than the bore of the gun, is seated on the casting, *c*, which centers it properly before the gun is discharged. When the case is forced out, the wings expand and release the shot, which flies onward while the case drops to the ground. Steel bolts are coming into general use in the navy, and the greatest damage inflicted on the *Monitors* in the recent naval battle was by missiles of the class here illustrated. Their destructive power is very great and has wholly revolutionized the art of modern warfare. At this writing some iron-clads have by no means kept pace with the artillery in respect to their offensive qualities. What will be done to render them equal in the future, time alone will show.

It will be seen that the particular shot here illustrated present great advantages in their sheet-iron casings over others not so fitted. It has been found by experience that wooden-cased shot, when stored in forts or places more or less damp, or when exposed to the weather, warp or shrink so much as to materially alter their shape and impair their value as projectiles. No such occurrence can take place with Smith's projectiles, as the metallic casings very fully protect them from injuries of the kind mentioned.

The patent for these shot and shell was procured on Dec. 23, 1862, by Wilson H. Smith, of Birmingham, Conn. The patent is assigned to himself and Royal M. Bassett, of the same place, and further information can be had by addressing them as above.

From every section of our country reports come to us, that all the crops afford promise of a most abundant harvest.

No less than 583,000 bushels of grain were shipped from Chicago in one day last week.

THE WATERBURY BRASS MILLS.

The Scoville Manufacturing Company.

To the seeker after mechanical information, or to those who are curious in matters relating to the inventive genius of mankind, no place offers a more extended field for investigation than the town of Waterbury, Connecticut. What Lowell in Massachusetts and Manchester in New Hampshire are to the cotton-spinners' avocation, Waterbury is to those who follow metal-working for a livelihood; and if the reader is interested in the manufacture of brass buttons, thimbles, brass wire, sheet brass, &c., he cannot spend time more profitably to himself than by strolling through the large factories devoted to those articles in the town just mentioned.

There are very many warehouses and workshops in Waterbury, all of which occupy spacious premises, and employ large numbers of men the year round. We will enter one of those factories—that of the Scoville Manufacturing Company—and relate what fell under our observation in the tour. The process of making military buttons, thimbles, hinges, and other wares will be briefly touched upon.

BUTTONS.

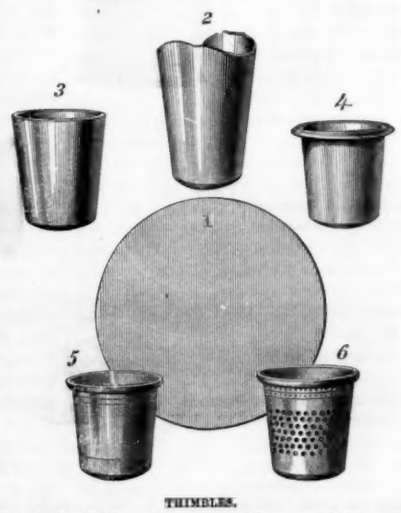
The parent of these useful articles is a large brass ingot about twenty inches in length by six inches in width and two inches in thickness. The reader will imagine a long roughly-paved room, wherein are a number of ovens or muffles, acid baths, pickle tubs, &c., for restoring the color of the brass lost while going through the various operations to which it is subjected. On one side of this room is a smaller one, wherein there is a set of furnaces in which the brass is mixed and melted. There are crucibles in these furnaces, and as we enter a workman has just removed one of them from the fire and is engaged in pouring the contents of it into an iron mold. With much effusion of gas and loud sullen breathings, as though protesting against such treatment, the brass finally settles down slowly into the mold. In due time it is turned out, and it is then a long brass ingot of the size previously mentioned.

The ingot just made is now taken to a pair of rolls where it is to undergo what is technically known as the "breaking-down" process. This is simply reducing its thickness; the rolls are of chilled cast-iron about eighteen inches in diameter and four feet long, and are accurately turned and polished. They are driven by huge gear wheels from the main water wheel in the center of the apartment. The ingot is presented to these rolls and as they revolve slowly they seize one end of it and gradually draw it in. When the ingot enters the rolls, it is about two inches thick; as it issues from them on the other side, it is reduced to about half an inch, and is of course much extended in length. This strip, or rather these strips (for we shall see many of them made) are now very hard, and must be taken to the muffle and annealed or softened before anything further can be done to them. This muffle is simply a huge oven heated to a high temperature, and while the bars are softening therein, we will say that sometimes the "breaking-down" process is reversed, and instead of the brass ingot passing through the rolls properly, it snaps them asunder in the midst and they fall out on either side. At one time an intractable ingot cost the company an outlay of $3,000, solely by its obduracy and stubborn spirit. After the brass has been properly annealed it is carried to the rolls and put through them again until it has been reduced to the required thickness. It is then taken to a bath and immersed for a while until the grease and scale and change of color, which the rolling and heating has effected in it is removed and it then issues bright and clean. If it is to be carried to other towns it is coiled up into compact rolls. In our case, however, it is to be made into brass buttons and we will follow the strip we have just seen manufactured into another room, where there are a number of presses running continually, at a high rate of speed. The workmen take our strip of brass and insert one end of it under the die, which as it comes down, punches out a round thin piece of metal; the strip is fed along continually until the surface is punched full of holes. The thin blanks cut out of these holes are taken to another machine and "drawn up," as it is called, into a shell or button-top, remotely resembling the finished article. This is the first process of making buttons.

In its present state the shell is unattractive in appearance, and altogether dead and dull; this unsightly exterior is removed by men at lathes. The comparatively rough brass is stuck on to a rapidly-revolving wooden chuck, and burnished by having a blood-stone set in a wooden handle brought into contact with it (these tools cost from $5 to $50, and are brought from Derbyshire, England); the brilliant lustre, so universally admired, is thus given to the shells and they are then ready to receive the design. The rapidity with which this process is executed defies description; so perfectly has the workman educated his hand to its duty that the eye can scarcely follow his movements and the buttons come whirling and dancing off the chuck and fly in all directions. They are now ready to receive the design, and we will follow them into another room where there are a number of stamps devoted to this use. These stamps are simply ponderous weights suspended by a strap, and running between guides. They fall some six or eight feet. The shell we have just seen made is placed in a matrix below the weight, the die on which the design is cut is secured in the same, when therefore the weight is drawn up and detached from its support, it comes down with a force like a pile-driver and a noise like thunder, and at one fell swoop imprints the eagle, claws and all! This operation also, like all others wherein the cost of an article depends very greatly upon the degree of mechanical skill attending its production, is very rapidly performed. With a dexterity acquired only by long practice the workman slips in the blanks and takes good care that his fingers are out of the way when the weight falls, else some unlucky miscalculation would stamp his digits into useless fragments. The huge weights rise and fall monotonously in the exercise of their functions; and we turn from this scene and seek another room, wherein the other half of the button—the back—is being made ready for use; as yet we have seen only the top or shell. The back is also a brass disk and has two holes perforated in it for the insertion of the eye. Like Polyphemus the button-back has but one eye, and this is firmly secured to the plate by solder and riveting or clenching the eye where it protrudes internally. The solder is applied by young women who sit at a long table, and the analogy between their mechanical occupation and similar household occupations is striking to the imaginative reader; provided with a doughy-looking paste or solder and a small scoop they dip out a portion of the former and place it about the eye of the button already inserted and riveted in another room. As fast as the operation is performed, the button-backs are placed in sheet-iron pans. These pans are then entrusted to certain heavy-eyed and slow-footed youths who carry them gingerly away as though they contained some delicacy which they were loath to part with. Once deposited in the furnace the genial glow fuses the amalgam in one mass and they are then ready to be cleaned and prepared for the final operation of closing them on to the shells or button-tops, previously mentioned. The cup-shaped top completely encloses the back to which the eye is fastened and leaves a flange sticking up all around. In this condition the button is placed in another machine and has its flange closed over by a die provided for the purpose. This part of the work may be likened to the operation of riveting a common eyelet in a piece of cloth or paper. The button is now finished and ready to be packed, if we clean it a little, and rub off the slight tarnish it may have received while undergoing the processes described. Some of the buttons, as for instance those intended for the coats of officers of high rank, are heavily coated with gold, "fire-gilt," so that they retain their pristine glory for a long time. This class of button has its design worked in very high relief, and three separate and distinct operations are needful to bring out all the strong points fully and clearly.

There are but few persons who cannot recall the earlier years of life when they felt a yearning for a jacket with brass buttons, that would not be appeased unless their desire was gratified. The longing does not cease with youth, if we may judge from "Patrick," newly landed from some emigrant-ship and clad in the full glory of shining brass; and others—not foreign, but to the manor born—who ostentatiously flout their brazen glories in the observer's face. These buttons, which tempt alike the fancy of young and old, are not made by machinery so far as the design is concerned. They are chased by hand; that is to say, the workman sits at a bench whereon is a small steel block on which the work in hand is placed. In addition there are a number of minute punches whose faces are impressed with an endless variety of patterns; some star-shaped, others like "the crescent moon;" some with leaves, angles, corners, in fact the varieties cannot be repeated here. From these punches the artist (so we may not inaptly call him) selects such as he deems desirable, and, with a small hand-hammer, drives them into the burnished button blank on the bench before him. The combination of punches produce the pattern. At the time we visited this room there were several patterns ready for the inspection of the foreman. This person examines them all, decides upon what is suitable for the market, and makes his selections accordingly. We have said elsewhere that machinery could not be used on this part of the button business. The reason assigned is that the constant percussion on the brass dims the brilliant finish of the punch and destroys its effect on the work. To renew this polish the workman has a small piece of chamois leather before him, charged with rouge powder, on which he, from time to time, rubs the punch and restores the lost gloss. If the punch were fixed in the died this would be impossible, and if we examine the military button we shall see that all the "struck" portions are originally dead or dull. The operation is performed very quickly, and while we have been writing this description the workmen—about twenty in one room—would have produced buttons enough for a regiment. The rapid clip, clip, of the hammers prevents monotony, and the impression produced is rather enlivening than otherwise. The buttons are all packed in paper boxes; and we are assured that the factory is capable of turning out 1,500 gross, or 86,400 buttons per day; on occasions, over 200,000 have been produced, but this is not by any means the working rate of the factory.

Let us turn from this item of the brass-working business and examine the manufacture of—



THIMBLES.

It is the fashion with some writers, we observe, to furnish their readers with full details of the ancient manner of doing this or that branch of business; no matter whether the subject be a prize-fight or a treatise on the Copernican system. We shall not follow those examples; and whether Lot's wife had a thimble in her pocket when she was turned into the pillar of salt, or if a gigantic thimble was used in connection with Cleopatra's needle, are matters which must remain profound mysteries. We shall not attempt to unravel them. Let those who will, kick up a dust among the moldy records of the past; be it our task to present the process of the day and the hour.

Thimbles are made out of all kinds of materials; but in this instance we shall revert only to those manufactured from brass and German silver. Here are some thimbles illustrated in the various stages of their construction. The flat disk, No. 1, is the

beginning of the thimble; No. 2 is the blank as it appears after being "drawn up," in the same general way as we have seen the button-top produced; No. 3 is the third stage where the rough edges are trimmed off by a man at a lathe; No. 4, is still another shape, having the bead turned at the lower end, and No. 5, the bead completed; No. 6 is the thimble ready for a lady's use. There are other operations performed upon each, as all the foregoing are distinct and separate; but we forbear mention of them. The indentations are formed by placing the thimble on a mandrel and causing it to revolve between steel disks which have a number of minute points in them corresponding to the punctures. The German silver thimble is usually esteemed the best for wear, as the metal is much tougher than brass; brass thimbles are generally silver-plated, and are also durable. When the thimbles are plated there is a small wire coiled about them so that they will not slip into each other and become united by the silver deposited on them. These processes are also extremely rapid; and although each thimble goes through many hands, it is by the reason of this very fact that they can be afforded at so low a price. These wares, however, are by no means the only ones made in this factory, and if we desire to see others we must leave the room we have just examined and enter another; as for instance that one wherein are manufactured—

HINGES.

Many thousands of hinges are annually turned out here. Their numbers would literally exceed belief. Brass hinges are made from a long strip of sheet-brass. Each individual hinge consists of two leaves, as the reader well knows; and these are both made at one operation. The press first cuts out a square piece of brass, very little larger than the intended hinge. This blank, or rather these blanks (for they are made in great quantities at a time) are taken to another machine, which cuts one leaf out of the other in such a manner that no metal whatever is wasted. In fact so exact is the separation that the parts cannot be fitted together again by hand without some filing. In the process described there have been small tongues left projecting from the side of the leaf, these are to form the joint or joints, of the hinge through which the wire passes. The joint is made in another machine by rolling up the brass tongues in a circular form; after this the joints are trimmed, have the wire inserted and are riveted by young girls, and are otherwise made ready for market. We must not omit to notice one machine, however, which would seem, to the uninitiated, to be unnecessary; that is the one for opening and closing the hinge. After they have been fitted up some slight inequalities, and the stiffness of the joint, makes it difficult to open them. This trouble is removed very speedily by the apparatus in question. With a duplicity of purpose and apparent simplicity of design, which would do credit to a veteran politician, the machine seizes the hinge presented to it, thrusts a steel point between the leaves, opens it completely, and passes it on to the other end, where a different movement completely reverses the previous operation and closes the hinge up again like a jack-knife; here it drops into a box and is carried away by an attendant, to be drilled and countersunk. Some hinges are polished; others are left in a rough condition, and all classes and patterns are made here, from those designed for a rough box or marine work, up to the silver-plated ones for pianos.

MISCELLANEOUS ARTICLES.

At one time large quantities of daguerreotype plates and metallic borders or "mattings" for the same were made here; but the introduction of photographs or card-pictures and ambrotypes, has materially lessened the consumption of them. The number still made, however, is far from being insignificant; and we will inform our readers how the plate is produced on which their graceful features are sometimes imprinted by the skillful fingers of the sun. A copper ingot of suitable fineness, having been selected, is placed in a lathe and faced off true on one side. This corrected surface is first coated with pure silver, and the ingot is then rolled out into a long strip, just as we have seen the brass worked. As the copper is reduced, the silver follows it, until the desired attenuation has been reached. But daguerreotype plates, thimbles, and hinges are only a part of the articles here produced; in addition there are a number of others which we are unable to describe in this connection for want of space. Of late years a highly ornate style of pill-box has been introduced, made out of thin sheet-brass, silvered over, and stamped with an appropriate design. We did not learn that the flavor of the pills was at all benefited by the improved method of preparing them for market; but we heard that one enterprising son of Esculapius circulated a quantity of his pills enclosed in the new style of box among a desirable class of customers, and the result—as briefly and tersely set forth by our informant—was that "They liked 'em so well, they came back for more." Kerosene lamp-burners are also produced in large quantities, and the manufacture of them involves no less than 111 distinct operations! We shall reserve a description of this branch of the brass business for another article.

The Scoville Manufacturing Company occupy large and commodious buildings, and contemplate extending their works still further at an early period. They afford employment to about 300 persons, and indirectly maintain a much larger number. At the time of our visit the great rush of the spring trade was nearly over, and the factory was having a "breathing spell," so to speak, before commencing for the summer. The packing-rooms resounded with the bustle and hurry of the workers therein, engaged in shipping the goods; and the motions of those individuals were characterized by a spirit of energy refreshing to witness. It is with reluctance that we close our article without adverting to other interesting details; but our readers must forego further progress over the Scoville Manufacturing Company's premises, and wait patiently until the appearance of our next article of this series, in which we shall conduct them through the large establishment occupied by Benedict, Burnham & Co. All of the work which we have described in this account was excellently made, and needs no praise at our hands; the company have been in active operation for a period extending over fifty years, and during that time it is quite possible that the reader himself may have worn out some of the hinges, or lost some of the buttons made by the busy wheels, the quick working presses, and the skill of the workmen employed by the Scoville Manufacturing Company, whose warerooms, at 37 Park Row, this city, are full of the products of their labor.

VALUABLE RECEIPTS.

BLACK ON GUN-BARRELS.—The following mode of producing a black coating on gun-barrels is taken from Mr. Wells's "Annual of Scientific Discovery" for the present year:—First, take chloride of mercury and sal-ammoniac; second, perchloride of iron, sulphate of copper, nitric acid, alcohol and water; third, perchloride and proto-chloride of iron, alcohol and water; fourth, weak solution of the sulphide of potassium. These solutions are successively applied, each becoming dry before the other is used. No. 3 is applied twice, and a bath of boiling water follows Nos. 3 and 4. The shade of color is fixed by active friction with a pad of woolen cloth and a little oil. The shade thus obtained is a beautiful black of uniform appearance. This process is used in the manufacture of arms at St. Etienne, France. We regret that the proportions of the different ingredients are not given. Several of our gunsmiths have made many inquiries as to the mode of producing the blue-black coating on the Whitworth and other English rifles. Perhaps the above solution will effect the object. The alcohol is used to make the application dry quickly. The perchloride of iron and the sulphate of copper in No. 2 should be used only in a moderately strong solution, and only about 10 per cent of nitric acid added to the water. We hope that our gunsmiths will meet with success in using these solutions. No. 2 applied in three or four coats, will form the common brown coating for gun-barrels. After the last application has become dry it is rubbed with a wire scratch brush, washed with warm water, then dried, and afterwards rubbed down with a composition of bees-wax dissolved in turpentine.

DYEING GLOVES.—MESSRS. EDITORS:—If you have lady readers, and I assume so, they must have occasion for a lively and beautiful drab color upon white or light-colored fabrics of cotton, silk, linen or wool, such as gloves, stockings, &c. They can produce a dye, which is quite permanent in its character, in five minutes, as follows:—To a pint of rain water add six or eight grains of nitrate of silver; when it is dissolved stir it well and immerse the perfectly clean fabric. See that it is well and evenly saturated, for which use a stick, not a spoon nor the hands. When thoroughly soaked it may be quickly wrung out with the hands, they being instantly washed. In a pint of water dissolve one quarter of an ounce of sulphuret of potassium, place the goods in it and saturate well, then wash in clear water and it is finished. It is better that the first-named solution should be hot, and a little time taken for wool. Glass vessels must be used.—R. H. A., Baltimore, May 11, 1863.

A Few Hints on Dyeing.

To those who wish to have certain fabrics dyed, the following information will be found useful, as regards the colors they will take. Thus, if the material be *black* it can only be dyed black, brown, d. green, d. crimson, d. claret, and d. olive. (*d.* stands for "dark" in all cases.) *Brown* can only be dyed black, d. brown, d. claret. *Dark green:* black, d. brown, d. green, d. claret, d. olive. *Light green:* d. green, black, d. brown, d. crimson, d. claret, d. olive. *Dark crimson:* black, brown, d. crimson, d. claret. *Light crimson* will take the same as dark crimson. *Claret:* black, brown, d. crimson, d. claret. *Fawn* will take d. crimson, d. green, black, brown, d. claret. *Puce:* black, brown, d. olive, d. crimson, d. claret. *Dark blue:* black, brown, d. crimson, d. green, d. claret, d. olive, d. blue. *Pale blue:* d. crimson, d. green, black, brown, claret, puce, d. blue, d. olive, lavender, orange, yellow. *Olive* will dye brown, black, d. green, d. crimson, d. claret. *Lavender:* black, brown, d. crimson, claret, lavender, olive. *Pink:* d. crimson, d. green, black, brown (as all tints will take a black and brown, these colors will not be repeated), pink, olive, d. blue, d. puce, d. fawn. *Rose*, same as *pink*, but also orange, scarlet and giraffe. *Straw, primrose* and *yellow* will dye almost any color required; as also will *peach* and *giraffe*. *Grey* will only dye, beside brown and black, d. green, d. claret, d. crimson, d. fawn, d. blue. White silk, cotton and woolen goods can be dyed any color. As cotton, silk and wool all take dye differently, it is almost impossible to re-dye a fabric of mixed stuff any color except the dark ones named. It will be observed by the above list that pale blue will re-dye better than any other color.—*Septimus Piesse, F.C.S.*

What Inventions have done.

The New York *Tribune*, in presenting from *Hunt's Magazine* a series of tables showing the increase of property in this country from 1800 to 1863, says:—"There has been an accumulation of very nearly $16,000,000,000, with an increase of income from $86,000,000 to nearly $2,000,000,000. In fact, it appears that three-fourths of this accumulation and increase of income have been made during the last 20 years. It is evident, therefore, that the power of production has received an immense impulse in the present century, in great part owing to the application of steam to transportation (which has virtually multiplied capital by causing its more rapid conversion), and the invention of labor-saving machines, with which, as the cotton-gin for instance, one hand can now do the same work that required four hundred hands formerly."

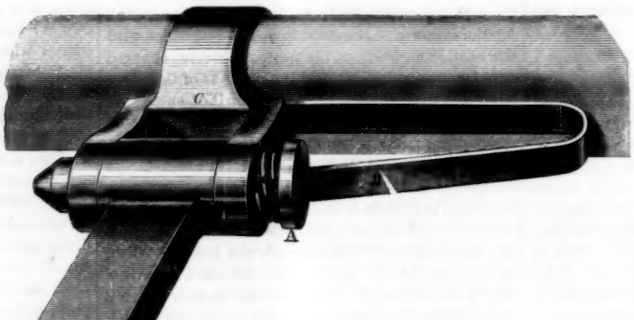
BURNING AND EXPLODING OF GASES.—Sir H. Davy, in his important and interesting experiments, found that light carbureted hydrogen, the most powerfully explosive of the gases, required about seven times its bulk of atmospheric air to be mixed with it to produce the greatest explosive effect; practically, it may be calculated that from eight to nine times its bulk of air will produce the most explosive mixture of coal-gas; but, the air and gas must be mixed previously to inflammation. No matter how rapidly the air may be supplied when the gas is burning, it will merely increase the fierceness of the combustion; there will be no explosion. To form an explosive mixture, the gas must be present in quantity varying from about 7 to 25 per cent of volume; if it fall short of, or exceed, that proportion, it will burn away quietly and not explode.

Anti-incrustation Composition.

The incrustation of boilers is a matter just now engaging much attention, and the usual result shows itself in a multiplication of special patents. Mr. Alexander Delrue, of Dunkirk, France, has taken out a patent for compositions to prevent and remove incrustations. The compositions are composed entirely of vegetable matters, and are prepared by dissolving or infusing in hot water the bark of the oak and pine, as well as the leaves of the sumach tree, ground and reduced to the state of a coarse powder; this decoction is concentrated to a density of about 10° Beaume, and to it is added a quantity (say from 15 to 30 per cent.) of cream of tartar (bitartrate of potassa) and spirit of turpentine. In employing this liquid to prevent incrustation, a quantity of it is introduced from time to time into the steam boilers. The quantity of the liquid required varies according to the capacity of the boiler, three pints of the liquid being generally sufficient for every thousand pints of water in the boiler, to prevent incrustation forming for about ten days.

Improved Carriage Shaft Fastening.

The annexed engraving is a representation of an improved method for connecting shafts of carriages to the axletree. It dispenses with the nut and screw, usually employed for that purpose, and provides for the speedy detachment of the shafts from any vehicle to which they may be affixed. The invention consists of the bolt, A, and the spring, B, secured firmly to the jaw, C. The end of this spring bears against the bolt, and keeps it in its place. There is also a small spiral spring, *a*, inserted between the head of the bolt and the jaw, which prevents that rattling of the parts so annoying to nervous persons and also to the horse. The bolt is removed by simply depressing the spring, B; it can then be withdrawn and the shaft or tongue of the carriage removed. The apparatus is at once simple and efficient. This invention was patented November 11, 1862, by Nathaniel Richardson, Byberry, XXIII. Ward, in the city of Philadelphia. Further information may be had by addressing Samuel Comly, at the same place, or Geo. De B. Keim, 162 North Third street, Philadelphia.



RICHARDSON'S PATENT SHAFT COUPLING.

HISTORY OF ANILINE COLORS.

The beautiful red, violet, lilac and other aniline colors which are now so common on silk and fine woolen fabrics are of but recent origin, and may be ranked among the highest achievements of organic chemistry. A peculiar scientific value is attached to them, on account of their strictly artificial character, they being manufactured chiefly from the products of coal tar. A very interesting little treatise has just been produced by Dr. F. R. Hoffman, 47 Fulton street, this city, on the origin and nature of aniline colors, forming a succinct history of their discovery and manufacture. Although we have already presented much information in the SCIENTIFIC AMERICAN respecting those beautiful colors, the following, which is condensed from Dr. Hoffman's treatise, will still be found instructive to our readers who are engaged in chemical pursuits:—

Until 1826 all the organic bases which had been discovered existed in nature, principally in parts of vegetables ready formed, and were not volatile, excepting when they were decomposed. In that year, however, Otto Unverdorben, of Berlin, Prussia, discovered a volatile liquid in the dry distillation of indigo, and this was the first artificial organic base. It was called "krystalline," from its property of forming salts readily with acids. This liquid artificial organic base was the very substance which was destined, thirty years after its discovery, to serve as the material for preparing aniline colors, and to become of such high importance in industrial chemistry. From 1830 to 1836 F. Runge, of Oranienburg, near Berlin, Prussia, was occupied in an investigation of the component parts of coal-gas tar, and he published the results of his researches in 1837. Among the constituents of tar he eliminated an oleaginous volatile base, which he called "kyanol," on account of its property of forming various colors, from red to a deep blue. In 1839, J. Fritzsche, of St. Petersburgh, Russia, discovered anthrallic acid, a product of the action of caustic potassa lye on indigo. By decomposing it at a high temperature, the product he obtained was carbonic acid and a colorless basic oil, which latter formed crystallizable salts with the acids, and which he termed "aniline," from the generic name of the species of plants furnishing indigo. The three bases thus discovered by these three chemists were held to be distinct and different until 1840, when Prof. O. L. Erdman, of Leipsic, proved them to be one and the same substance, for which he retained the name "aniline." In 1842, A. Zinin, of Dorpat, in treating nitrobenzole with an acid and alcohol, obtained a volatile base, which he called "benzidam," which was also found to be aniline. But this was an advancement in the line of manufacture, as it was made from a special derivative of coal tar. In 1845, A. W. Hoffman and J. S. Muspratt, of London, produced aniline by passing the vapor of salicylamin over red-hot quicklime; and from this time forward the study of the secondary products of aniline was continued by several chemists, foremost among whom was Prof. A. W. Hoffman. Through his researches and published essays aniline soon became one of the most closely-examined organic bases. These studies which were undertaken and continued through many years, merely for scientific purposes, led to a more practical application in 1856, by William H. Perkins, of London. None of the mentioned methods which had been employed to obtain aniline is at present used to furnish the material for aniline colors, hence the history of the practical part of aniline, as applicable to manufactures, commenced in 1856. Aniline is ready formed in coal tar, but it is generally prepared from benzole, which exists in greater quantities in coal oil; it is made by first converting the benzole into nitro-benzole with nitric acid, then it is reduced with the acetate of protoxide of iron, according to the mode first proposed in 1853 by A. Bechamp, of Paris.

Aniline is one of the organic derivitives of ammonia, and it may be viewed as an ammonia in which one equivalent of hydrogen is replaced by the compound radical, phenyl. It consists of 77·7 per cent. carbon, 7·5 per cent hydrogen, 14·8 per cent. nitrogen. The basic character of aniline is well developed. It combines with all acids, forming a series of salts which are the perfect analogues of the corresponding salts of ammonia. In general they are colorless, but assume colors varying from red to blue by exposure to the air. The aniline colors, red, blue and their mixtures, purple and violet, are neither salts of the alkaloid aniline, nor are they simple compounds of uniform composition. They take from aniline salts only their origin and name. Their formation has not yet been fully elucidated or brought to a scientific conclusion.

In 1856, while W. H. Perkins was treating the sulphate of aniline in Prof. Hoffman's laboratory, with the bicromate of potash, he obtained a dark resin, which was found to be soluble in alcohol and yielded a deep violet color. He prepared this resinous coloring matter, and in the same year introduced it first as a violet dye, and soon afterward as a blue dye, and he obtained the first patent in England for aniline coloring products on February 2, 1857, and one for France on April 8, 1858. Near the close of 1857, Prof. F. Crace Calvert and Charles Lowe, of Manchester, England, prepared aniline red colors for dyeing, but did not publish the process nor introduce the color for industrial purposes, because it was then too expensive. Prof. Calvert delivered a lecture on Feb. 18, 1858, before the London Society of Arts, in which he stated that he had prepared colors from the products of coal tar, that were applicable to calico printing. A complete and detailed method for the preparation of aniline red was first communicated by Prof. A. W. Hoffman, to the Royal Society, London, on June 17, 1858; and also in a memoir to the Academy of Sciences, in Paris. He used 3½ parts, by weight, of anhydrous aniline, and 1 part of bichloride of carbon, and submitted them for 30 hours to a heat of 338° Fah., and obtained a resinous product, which, when treated with alcohol, &c., yielded a rich crimson color. William H. Perkins was the first person who prepared and introduced aniline colors, and to him belongs the chief credit of their application to the industrial arts. The honor of the discovery of aniline red colors, however, belongs justly to Prof. Hoffman, who first published the method of preparing them; and it was his method that was first employed in France by A. Verguin, of Lyons, in 1859. Messrs. Renard Freres, of France, took out a patent for the manufacture of aniline colors in April, 1859; they having engaged A. Verguin as their chemist, and they have been extensive manufacturers of such products ever since. Dr. Hoffman asserts that they cannot be considered as having any part in the discovery or improvements of such colors.

Most of the aniline red is at present prepared in England, France and Germany with arsenious acid. The use of this substance was introduced and patented by R. Heilman, December 10, 1859.

A definite method of preparing aniline blue was first made public by Horace Köchlin, of Glasgow, in 1860. It was obtained by the action of bichromate of potassa in a mixture of aniline and hydrochloric acid. In 1861 the aniline color called *Bleu de Paris* was made by Persoz de Luynes and Salvetat, of Paris. It is formed by the action of bichloride of tin on aniline, at the boiling point of the latter, in a hermetically-sealed tube. Since that period quite a number of patents have been taken out in France and England for the manufacture of aniline blue.

The favor with which aniline colors were received upon their first introduction in 1856, led scientific and practical chemists to pursue their study with a zeal that has no parallel in the history of chemical industry, and at the present moment cnemists are still busily engaged upon their investigation, because there is yet much that is obscure connected with the action of the substances that are employed to vary their shades. These colors will undoubtedly retain a permanent place in the manufacturing arts, and it appears to us that they can be manufactured here as well as in Europe, from whence we have hitherto imported all that has been used by our dyers and printers. Their chief source is the product of distilled bituminous coal, and this can be obtained in unlimited quantities from our Western coal fields.

THE Providence (R. I.) Tool Company have a contract for 50,000 rifled muskets of the Springfield pattern, and 7,000 have already been delivered. All the parts—locks, stocks, barrels and bayonets—are produced by the above-named company, who employ 650 men in the manufacture of muskets.

IT is claimed by agriculturists that Minnesota is a great State for the culture of flax, and as linen can be substituted for cotton almost wholly, the dominion of King Cotton might be disturbed by its cultivation.

THE WONDERS OF THE SKIN.

The skin of our bodies is a wonderfully complex structure, and in the animal economy its functions are of the most important character. The stomach, the liver and even the brain itself are not so necessary to life as the skin. Persons may live for several days without food, and the liver may wholly cease to act for several days before death results, but death will ensue in a few hours if the functions of the skin are destroyed. Experiments have been made with the lower animals, and the results show that the skin is the most important auxiliary to the lungs in the process of the aëration of the blood. By varnishing the fur of a rabbit or coating the skin of a pig with an air-tight substance, the animal dies in about two hours with all the symptoms which are produced by cutting off the supply of air from the lungs. On the accession of Leo X. to the papal chair of Rome, there was a grand procession in Florence and a little girl was coated all over with gold leaf, to represent "The Golden Age." The child died in a few hours in convulsions, to the horror of the spectators, who were ignorant of the cause. From such facts we may infer how important it is for health to keep the skin in an efficient state, so as to discharge its functions; and this part of the human body has been placed within the control of man, while most of the other organs of the body are beyond his visible control.

In insects the entire respiration is conducted by means of pores in the skin called *spiracles*. These are guarded by minute hairs, but if a feather dipped in oil is applied to the abdominal portions of an insect's body, such as that of a wasp, it dies almost instantly from suffocation.

Aëration of the blood is not, however, the only function which the skin has to discharge. Absorption is also carried on by the lymphatic vessels which permeate the skin everywhere over the whole surface of the body. Persons in whom disease of the throat closed up the natural entrance to the stomach have been kept alive for days and weeks by being frequently immersed in baths of warm milk; the celebrated Duc de Pasquier, who died in France not long ago at the age of ninety years, had been kept alive for several weeks before his death by such means. Various salts have been detected in the secretions of persons who have used baths containing those salts in solution. The skin may also be said to be the special organ of the sense of touch. It forms a beautiful covering for the body, preserves the delicate structures underneath, regulates the intensity of sensations from without, and by excretion it removes from the body materials which are no longer of any use to it, and which, if retained longer, would become injurious.

The structure of the skin shows how beautifully it is adapted to the discharge of its important offices. It is composed of two layers—the outer layer is called the *cuticle* or scarf skin and sometimes the *epi-dermis*, and the inner one is called *cutis* or true skin and sometimes the *dermis*. This latter rests upon an interlaced netted structure called the *areolar tissue*, out of which the granules and fibers of the skin are formed. At one time it was held that there was a third layer called the *rete mucosum* or pigment-layer, between the true and scarf skins, but from later researches it is ascertained that there is no such layer, and that the pigment cells to which the color of the skin in different races is due are but a development of the scarf skin. In general the scarf skin is thin, but the true skin is of variable thickness, and it is so thick in the rhinoceros, hippopotamus, elephant, &c., as to have acquired for them the name of pachydermatous animals. The cuticle consists of several layers of laminated scales which are formed by the flattening of the granules in the deeper layers. These granules, in man, are at first nucleated cells, and the coloring matter of the skin resides in these. They are very minute, being about one three-thousandth of an inch in diameter, then as they approach the surface and assume the scaly form their diameter increases to about one six-hundredth of an inch. In many animals and fish the scales are very large, still they are only a modified form of the epidermal scales in human beings. In the cuticle no nerves or blood vessels penetrate; it is nourished by the transudation of the serum of the blood through the vessels of the true skin and is devoid of sensibility, thus serving to blunt the sensibility of the true skin underneath. The cutis or true skin consists of two kinds of tissue composed of white and yellow fibers, the former being more dense and resisting and are always allocated wherever resistance to injury is most required, such as in the palms of the hand and soles of the feet. The yellow fibers are a very elastic tissue, and they are interlaced to form minute lozenge-shaped interstices which are principally filled up with the white fibers. The yellow elastic fibers exist in greater abundance at the flexures of the joints, the lips, &c., where elasticity of skin is most necessary. The uppermost surface of the true skin is very uneven, and is elevated into a vast number of papillæ, which are about one one-hundredth of an inch in length and one two-hundredth-and-fiftieth of an inch in diameter. Minute as these papillæ are, each possesses a ramification of nerve fibers which are the essential agents in the sense of touch. They are developed in greatest number along the tips of the fingers and the lips of man. The number of these papillæ is prodigious; a square inch of the palm of the hand contains about 5,000. On the tongue, where the *cutis* is extremely thin, they are larger than in other parts of the body. The sense of touch is very delicate in some persons, and it may be developed by constant practice. The blind can read by the sense of touch, through the fingers acting on raised letters; and in one case a blind girl, who had her fingers injured, learned to read by applying her lips to the letters.

With respect to the functions of secretion by the skin, it will be observed in looking at the furrows which cross one another on the hand, that there is a little orifice in the center of each; these orifices are perspiratory ducts, and the glands by which the perspiration is secreted are seated at the under surface of the true skin, each imbedded in a cavity. The materials for secretion are furnished by a minute capillary net-work of blood-vessels arising from arterial trunks which bring the blood to the gland to be purified, and they terminate in veinous trunks which carry off the blood when the purifying process has been performed. These glands remove from the blood materials that are no longer required in the body. Their size in the palm of the hand range from one one-hundredth to one two-hundredth of an inch in diameter; but in the arm-pits, where they form a very thick layer, they are about one-sixtieth of an inch and they form little membraneous tubes about one-quarter of an inch in length and one-seventeen-hundredth of an inch in diameter. About 3,500 of these little ducts exist in a square inch of the skin of the palm of the hand, and the whole number of them in a man's body, of ordinary size, if laid in a line, would make a string twenty-eight miles in length. This glandular system is a beautiful contrivance for regulating the internal temperature of the body, for the perspiration poured out through the pores carries off the heat of the body as fast as it is generated by the chemical processes going on within the system. It is exceedingly important that these glands should be kept open and in effective action. The burning heat of the skin is a marked sign of some diseases when the perspiration is arrested. The proper action of these glands maintain the temperature of the body constantly at 98° Fah., even under the most violent exercise. And for the same reason a degree of heat can be endured with impunity in dry air (which absorbs perspiration as in a vacuum) that would be perfectly unbearable in a warm moist atmosphere. M. Chabert, called the "Fire-king," who died a few years since at Hoboken, N. J., frequently entered an oven heated from 400° to 500° or within a few degrees of the temperature at which lead melts, and he would remain therein until a beefsteak was cooked. Had the oven been filled with steam of 212° he would have perished in a few seconds. About one pint of liquid evaporates through the pores of a man's body every twenty-four hours, and this contains about an ounce of solid matter in solution, besides a large amount of carbonic acid gas. We can thus form an estimate of the importance of keeping these ducts in perfect order by means of frequent bathing.

In connection with the hairs on the body there are sebaceous glands which furnish an oily substance to nourish the hairs. The ducts of these glands open generally into the hair-pits situated in the subcutaneous areolar tissue. These are frequently inhabited by a peculiar little parasite, especially in persons whose skin is torpid in its action. These glands lubricate the skin and serve to maintain its elasticity. Hair may be regarded as a kind of modified cuticle. Around the hair follicles and glands there are microscopical muscular fibers which act involuntarily; and fear and anger stimulate them to contraction and make the hair stand erect. In the Book of Job it is said: "Then a spirit passed before my face; the hair of my flesh stood up." These same muscular fibers extend everywhere throughout the skin, and when they contract by cold it assumes that appearance called "goose skin." The skin, although so simple in appearance, affords a beautiful illustration of the infinite skill and wisdom of the great Creator, not only in its wonderful structure, but with respect to all its varied functions.

Wool—Its Supply and Demand.

The New Hampshire *Journal of Agriculture* states that about 60,500,000 pounds of wool are raised annually in the country, and our manufacturers consume 80,000,000 pounds, thus showing a deficienoy of about one-third of the supply to meet the demand. From the scarcity of cotton at present, the demand for wool must increase, and efforts should be made to meet it with American-raised wool. In the British colonies in the South Pacific and Cape Town in South Africa, 86,700,000 pounds of merino wool are raised annually, nearly all of which is sent to England.

At the Ohio Wool-growers' Convention, lately held at Cleveland, the following resolution (as we learn by the *Ohio Farmer*) was adopted:—

Resolved, That the practice of washing sheep should be abolished, because—

1st. It will permit early shearing, which secures a greater quantity of wool, a longer staple and a better condition of sheep and lambs through the year.

2d. Of the exposure to contageous diseases, such as scab, foot rot, &c., in places frequented by different flocks to be washed.

3d. It is an expensive, unpleasant job, and unhealthy, both for man and sheep.

4th, That the manufacturer must cleanse the wool at all events, and he can do it cheaper than the grower.

5th. That it is to the interest of wool-growers to put their unwashed wool in as good condition as possible, by keeping their yards well-littered, and by throwing away all filth that can be separated from the wool.

6th. Some lots of wool are more gross and gummy than others, therefore no rate of deduction could be agreed upon, suitable to all grades and classes, but each lot should be bought upon its own merits for quality and condition.

7th. As generally practiced, washing is little or no improvement to the fleece.

Petroleum for preserving Wood.

The oil wells near Prome, in Burmah, have been in use from time immemorial. Wood, both for ship building and house-building, is invariably saturated or coated with the product of those wells. The result is entire immunity from decay, and the ravages of the white ants that in that country are so generally destructive. M. Crepin, a Belgian Government engineer, who has tried experiments upon the relative advantages of creosote and sulphate of copper for the preservation of timber in marine constructions from the attacks of worms, &c., says that creosoting is the only process he has found to succeed for this purpose. He states that sulphate of copper affords no protection whatever against the action of salt water and marine insects. The Belgian Government now require that all the wood sleepers used in the State railways should be creosoted; and the Government of Holland have also made the same resolution, and upwards of 300,000 sleepers per annum are now being creosoted by the Dutch Government, and more by the Belgian Government.

Rebel-manufactured Fire-arms.

A correspondent (says the Richmond *Whig*) writes us as follows:—"Forty new Sharpe's rifles, with the Richmond stamp on them, were handed, yesterday, to my company. The men were ordered to test them. Nine were fired, and seven of the nine bursted!" Our correspondent says that in this business he got his hand badly hurt, and he suggests that the manufacturers of those arms had better be sent to the field, where they can be furnished with Yankee sabres, taken from the enemy, while the time they are wasting can go to the use of the farmers. He also complains of the saddles furnished the cavalry, and says: "They frequently break before we mount the first time."

Correspondence

Ship-building—Iron and Wood combined.

Messrs. Editors:—Sometime ago you were kind enough to publish an account of the steamer *Niphon*, built with an iron frame, and planked with oak. That vessel has been sold to the Government, and has gone to sea under the command of Capt. J. B. Breck, I had the pleasure of making a passage in her to Fortress Monroe, and found her stiff, easy, and free from the excessive rolling of our gunboats, which I attribute partly to her model and partly to her bilge keels, or "outside kelsons," which steady her and do not impair her steering or sailing qualities. The system of building by a combination of wood and iron, is making considerable progress in England, as you will see by the inclosed.

R. B. Forbes.

Boston, May 7, 1863.

[The article to which our correspondent alludes is a letter addressed to the *Shipping and Mercantile Gazette* (London) by Thomas Evans, of Bristol, who states that about ten years ago two ships—the *Tubal Cain* and *Mayard Macintyre*—were built with wood planking upon iron frames, by Messrs. Jordan & Jetty, of Liverpool; and now in London, Glasgow, Sunderland, Aberdeen, and other places ships are being built in which iron, for framing and beams, is introduced in combination with wood planking. Mr. Evans states that he had lately visited Sunderland, when he found three ships of this character under construction, and he gives the following description of one of them:—"The keel, of wood, is laid in the usual manner, and stem and sternpost, also of wood, are fitted and fastened to the keel precisely as in the case of a wooden-built ship. The ship is then set in frame, which is of iron, and in space or size, the same as in a regular iron-built ship. These frames are all riveted into an iron plate on the keel, which plate extends to a sufficient width to take in the garboard strakes, which are bolted through the keel, and also through this plate and the frame; the frame is then diagonally trussed on the outside with flat iron bars, extending from the keel plate to the sheer strake, five or six feet apart, and riveted to each frame. The beams, which are also of iron, both in the upper and lower decks, are then fitted in and well secured to the frames by stringer plates, and angle iron; so that the ship becomes a strong rigid structure in frame, before any planking is fastened on the sides. The plank, which is from ½-inch to ⅝ths thicker than Lloyd's requirements for a wooden ship, is then fitted to the framing, being scored on over the diagonal trussing, and secured to the frames by bolts of yellow metal, driven from the inside, and clenched upon rings of the same metal on the outside plank. To prevent galvanic action, by the contact of the iron and yellow metal, Messrs. Moore, the builders, have patented an ingenious contrivance, which consists in a collar of lead and some other metallic substance combined, which is fitted tightly into the hole in the frame through which the metal bolt is to pass; the bolt is then driven and clenched as before named; a capsule, of the same material as that through which the bolt is driven, is then fitted over the head of the bolt, and soldered to the collar beneath, so that no external action can affect the bolt thus hermetically sealed. It appears to me, therefore, that, taking into account the great rigidity of the framework of a ship so built, the increased lateral strength given by the thick plank being well fitted on over the diagonal trussing, and the more perfect connection between the stringer plates, beams, and framework, than can be obtained in an ordinary wooden-built ship, there is nothing to be apprehended in regard to the strength of a ship so built." The advantages of this system of ship-building are apparent to practical men, and we think it should commend itself to our ship-builders in New York and other places. At all times it is difficult to procure first-class crooked-frame timber, and at present it cannot be obtained in sufficient quantities to meet the demand. Iron framing will relieve them of this difficulty, and measures should be taken for the erection of works and machinery to roll such iron for ship-framing. It is difficult to obtain the sharp angular floors of the fore and after body of a timber-framed vessel; but there is no curve so sudden, or angle so acute, but can be easily formed in the iron frame. Beams, too, especially in large high-class ships, are often difficult to obtain, and are expensive, whereas in the use of iron, all is simple and easy. With such framing an internal capacity for carrying a cargo equal to that of an entire iron vessel is secured, and such ships can also be sheathed with yellow metal, and thus remove all difficulty as to fouling, so common a complaint in regard to iron-built ships.—Eds.

A Churn Power Wanted.

Messrs. Editors:—On page 278, current volume of the Scientific American, I noticed a communication from J. B. Schooley, of Wyoming, Pa., inquiring for a real practical and useful invention for saving the labor of churning, which, at the same time, will avoid the unpleasantness and inconveniences of the various machines moved by animal "powers" now in use. Your readers will remember that an engraving and description of such a "power" was published on page 64, current volume of the Scientific American. I saw that notice and became much interested; I have since seen the "power" itself tested, and am fully convinced that it is all that Mr. Schooley could desire. Your remarks (following Mr. Schooley's inquiry) call upon inventors to go to work and "reap the praise and pence of the over-taxed farmer's wives" by producing a "power" adapted to the work. Now allow me to say that your call is already obeyed—the work is done. A. A. Drake's patent churn-power, patented on July 8, 1862, and illustrated and described in the Scientific American (as above referred to), is just the thing desired by Mr. Schooley. It works like a charm [or *churn?*]. It obviates all the unpleasantness and inconveniences of animal "powers," and operates incomparably better than any of them. The illustration and descriptive details of Drake's churn, published in that number of your valuable journal dated January 24 (page 64), so attracted my attention that, like some scores of others in this section, I embraced the earliest opportunity to examine the "power" itself. [Here is a hint to inventors.—Eds.] Mr. E. D. Cramer, of Hackettstown, N. J., who is now selling rights in this State, has recently visited this village, and exhibited one of Drake's "powers." I examined it carefully, saw it thoroughly tested, and my anticipations of it were more than realized. Once winding the machine (which requires from two to three minutes and is easily done by a child) will give from fifteen hundred to two thousand strokes, and it can be so regulated as to make the strokes of any depth, from eight to twenty inches, and will work a churn of any size, from one quarter of a barrel to two barrels. This is just exactly the thing inquired for, and will save all the hard work of churning.

John Smith.

Easton, Pa., May 5, 1863.

An Inventor who is More than Satisfied.

Messrs. Editors:—My patent for an improved coffee-roaster came to hand yesterday, and after carefully reading it I find that you have succeeded beyond my hopes based upon what I was led to expect from the first official letter informing me of a rejection. I find that I have got all I ever wanted; the patent being a good one. I shall in future recommend the Scientific American Patent Agency to parties having business with the Patent Office. You will accept my thanks for your successful efforts in my case.

C. H. Mills.

Hazel Green, Wis., May 5, 1863.

Remedy for Sea-sickness.—Neptune is in a fair way to be deprived of a portion of his honors, if we may credit the following prescription said to be sovereign against sea-sickness:—The surgeon of the steamship *Great Britain* has found the most successful remedy to be the nitro-hydro-chloric acid, with sulphate of magnesia. He offers this formula: dilute hydro-chloric acid, two drachms; dilute nitric acid, one drachm; hydro-cyanic acid, sixteen drops; water, eight ounces—mix. Two tablespoonfuls to be taken every three or four hours.—*Medical and Surgical Reporter.*

Do not put Dirty Wool inside of a Fleece.

The *Wool-grower* states that an important wool suit was recently decided at Bath, Steuben county, N. Y., in which O. A. Willard & Co., of Boston, were plaintiffs, and Enos Merritt, wool-grower, of Yates county, N. Y., was defendant. The plaintiffs alleged fraud, and set forth in their declaration that in July 1860, their agent, J. W. Davis, of Hammondsport, N. Y., bargained with defendant for 142 fleeces of wool at 47½c. per lb., a full market price at the time, for good fine wool, to be delivered in good condition.

Davis testified that he agreed for the wool on the sheep's back, soon after it had been washed, and the defendant agreed to put his wool up in good condition. The wool was brought and delivered to Davis, apparently in good fair condition, externally, and he received it and paid the stipulated price. But soon after he discovered by opening some fleeces that some one-half pound of unwashed tags, and much dirt and filth were in each fleece. This was proved by several witnesses, who assisted in opening the fleeces.

The defendant proved that he washed his sheep clean and put up his wool in good condition, but acknowleged that he put unwashed tags in each fleece, and claimed that it was the common custom of wool-growers in his vicinity. He introduced several who swore that such was their method, and supposed it to be the general usage.

Plaintiffs proved by several respectable farmers, that they never put their unwashed tags in their fleeces, and they were not aware that it was customary to do so. It was argued by counsel for defense that the common usage should protect his client in putting in his tags; inasmuch as Davis received, accepted, and paid for the wool and made no objection at the time, plaintiffs should not recover. Also, he claimed that it was Davis's duty to open the fleeces at the time, to ascertain their condition.

Counsel for plaintiffs argued that inasmuch as the wool appeared outwardly in good order, the agent had good reason to believe that the inside of the fleeces must be in corresponding condition, according to the usual appearance of the inside and outside of fleeces. The court so ruled, and remarked that the purchaser was not obliged to open the fleeces when he purchased wool, to ascertain the condition, and the seller had no right to conceal anything in the fleece, like unwashed tags or anything unmerchantable. The jury found 16 cents per pound damage for plaintiffs on 748 lbs. of wool, with interest from the time of purchase. The defendant also had to pay the costs of the suit.

How to treat Dwarf Pear Trees.

The following is from a correspondent of the *American Agriculturist*:—

"I have dwarf pear trees fifteen years old in my garden—thrifty, hardy, productive, and bidding as fair to live the next fifty years as any standard tree upon my grounds. The complaints against these pets of the garden, I am fully persuaded, are owing more to neglect and mismanagement, than to any inherent difficulty. Some varieties will not flourish on the quince stock; the fruit books will point them out; do not plant such. They will not be productive on grass land, or in hard inflexible soil; do not plant them there. They want a deep, rich, mellow border, at least eighteen inches in depth; if you cannot afford to prepare a border, do not purchase dwarf pear trees. In addition to being properly planted, they must have care every season. Now they should be shortened in, about two-thirds of the last season's growth. This keeps them "stocky," and prepares them to sustain a great burden of fruit. They also want a barrow-full of stable manure put around them every fall. The quince roots cannot go far in search of food. They should have all they can take up within six or eight feet of the tree. With manure and good management dwarf pears will be a success."

The Popularity of Steam Fire-engines.—No less than seventy steam fire-engines have been made up to this time by the Amoskeag Company, of Manchester, N. H., including some for almost every large city in the Union, two for Halifax and one for the Russian city of Amoor. Thus do American inventions penetrate to every portion of the earth.

Bombarding a Balloon.

The "professor" aroused me at three o'clock, when I found the canvas straining its bonds and emitting a hollow sound, as of escaping gas. The basket was made fast directly, the telescopes tossed into place; the professor climbed to the side, holding by the network, and I coiled up in a rope at the bottom.

"Stand by your cables!" he said, and the bags of ballast were at once cut away. Twelve men took each a rope in hand and payed out slowly, letting us glide gently upward. The earth seemed to be falling away and we poised motionless in the blue ether. The tree-tops sank downward, the hills dropped noiselessly through space, and directly the Chickahominy was visible beyond us, winding like a ribbon of silver through the ridgy landscape.

Far and wide stretched the Federal camps. We saw faces turned upwards gazing at our ascent, and heard clearly, as in a vacuum, the voices of soldiers. At every second, the prospect widened, the belt of horizon enlarged, remote farmhouses came in view; the earth was like a perfectly flat surface, painted with blue woods, and streaked with pictures of roads, fields, fences and streams. As we climbed higher, the river seemed directly beneath us, the farms on the opposite bank were plainly discernible, and Richmond lay only a little way off, enthroned on its many hills, with the James stretching white and sinuous from its feet to the horizon. We could see the streets, the suburbs, the bridges, the outlaying roads, nay, the moving masses of people. The capitol sat white and colossal on Shockoe Hill, the dingy buildings of the Tredegar works blackened the riverside above, the hovels of Rockets clustered at the hither limits, and one by one we made out familiar hotels, public edifices and vicinities. The fortifications were revealed in part only, for they took the hue of the soil and blended with it; but many camps were plainly discernible, and by means of the glasses we separated tent from tent and hut from hut. The Confederates were seen running to the cover of woods that we might not discover their numbers, but we knew the location of their camp-fires by the smoke that curled towards us.

"Guess I got 'em now, jest where I want 'em" said Professor Lowe, with a laugh; "jest keep still as you mind to, and squint your eye through my glass, while I make a sketch of the roads and the country. Hold hard there and anchor fast!" he screamed to the people below. Then he fell imperturbly to work, sweeping the country with his hawk eye, and escaping nothing that could contribute to the completeness of his jotting.

We had been but a few minutes thus poised, when close below, from the edge of a timber stretch, puffed a volume of white smoke. A second afterward the air quivered with the peal of a cannon. A third, and we heard the splitting shriek of a shell that passed a little to our left, but in exact range and burst beyond us in the ploughed field, heaving up the clay as it exploded.

"Ha!" said Lowe, "they have got us foul. Haul in the cables—quick!" he shouted in a fierce tone.

At the same instant the puff, the report and the shriek were repeated; but this time the shell burst to our right in mid-air and scattered fragments around and below us.

"Another shot will do our business," said Lowe between his teeth; "it isn't a mile and they have got the range."

Again the puff and the whizzing shock. I closed my eyes and held my breath hard. The explosion was so close, that the pieces of shell seemed driven across my face, and my ears quivered with the sound. I looked at Lowe to see if he was struck. He had sprung to his feet and clutched the cordage frantically.

"Are you pulling in there, ye men?" he bellowed, with a loud imprecation.

Puff! bang! whiz-z-z-z! splutter! broke a third shell, and my heart was wedged in my throat.

I saw at a glimpse the whole bright landscape again. I heard the voices of soldiers below, and saw them running across fields, fences and ditches, to reach our anchorage. I saw the waving of signal flags, the commotion through the camps—officers galloping their horses, teamsters whipping their mules, regiments turning out, drums beaten and batteries limbered up. I remarked, last of all, the sight of the battery that alarmed us, and by a strange sharpness of sight and sense, believed that I saw the gunners swabbing, ramming and aiming the pieces.

Puff! bang! whiz z-z z! splutter! crash!

Puff! bang! whiz-z z-z! splutter! crash!

"My God!" said Lowe, hissing the words slowly and terribly, "they have opened upon us from another battery!"

The scene seemed to dissolve. A cold dew broke from my forehead. I grew blind and deaf. I had fainted.

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"Pitch some water in his face," said somebody. "He ain't used to it. Hellos! there, he's come to."

I staggered to my feet. There must have been a thousand men about us. They were looking curiously at the aëronaut and me. The balloon lay fuming and struggling on the clods.

"Three cheers for the Union bal-loon!" called a little fellow at my side.

"Hip, hip—hoorooar! hoorooar! hoorooar!"

"Tiger-r-r—yah! whoop!"

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The balloons were prominent features of the two terrible months ensuing, and during the battles of Hanover, Seven Pines, and the bloody sixty days' struggle before Richmond, they were invariably afloat. Lowe seldom made ascensions on windy days, but in the dead June calm of that almost tropical climate he had opportunities for safe and frequent reconnoissances. Mr. Phox, of the *Popgun*, one day transcended his powers by published a minute description of the Federal position as seen from this exalted point, and the commanding general forbade the balloon to correspondents thereafter. So we were obliged to receive the news from the lips of the "professor," and Phox, having no more imagination than old Joe Willett, fell sadly short in his reports. Some of us were not so dismayed, and the correspondent of the *Howitzer*, having a fertile fancy, professed to have looked into the Gulf of Mexico, and solved the mystery of the whereabouts of Beauregard.—*St. James's Magazine.*

A New Iron Furnace.

The furnace of Messrs. Graff, Bennett & Co., of Pittsburgh, Pa., is truly a novelty in the furnace line. Like the city in which it is, it may appropriately be called an iron furnace. It is 45 feet high and 12 feet bosh. It is only 16 feet over all, the outer wall being boiler-plates, firmly riveted together, with an inner wall of 2 feet—the whole standing upon 9-feet iron columns above the hearth. It produces an average of 18 tuns of pig per day, and has now been in blast the greater portion of the time for about three years. We believe it uses our ores entirely. This, we think, is the first iron furnace ever erected. Thus far, not a rivet has loosened in its entire surface, while its success has been so highly gratifying that the same firm are now erecting two more at Manchester, on the Pennsylvania Central Railroad, near its junction with the Cleveland and Pittsburgh Road, some few miles out of the city, and where our ore and the coal will both reach the furnace without any transhipment. These are to be 13 feet bosh, with walls 2 feet 6 inches inside of the iron hull. It is expected that they will produce at least 20 tuns each per day. Each will have a separate engine of sufficient power to drive both, which is a precautionary measure in case of accident to either. We have no question but that these will be as fine, indeed, we might say the finest furnaces in America, as no money, experience and skill will be spared to make them such. It is intended to have them ready for blast by August 1st.

Messrs. Jones & Laughlins are also erecting a furnace at Pittsburgh to smelt our ores, which will be completed at an early day. The size and character of this we did not learn, as we did not have time to visit them. These three new furnaces will smelt annually some 35,000 to 40,000 gross tuns of our ore—about doubling the amount of last year. Thus the good work goes steadily forward.—*Lake Superior News.*

ADJECTIVES are to nouns what pepper, salt, mustard, vinegar, sugar, molasses, butter, and other condiments are to the food we eat—very good in moderation, and when appropriately applied.

Enlarged Photographic Pictures for Ornamentation on Glass.

The following are a few remarks made by Dr. Taylor at a late meeting of the Glasgow Photographic Association, and published in the London *Photographic News*:—

"The house-painter at present exercises his faculties in decorations, and so long as he confines his efforts to ornamental scrolls or geometrical patterns, he succeeds moderately well; but when the human figure or other object, requiring accurate and subtle drawings, is attempted, the results are too often anything but beautiful or instructive. Drawing is an art in which few obtain perfection, but photography promises to bring a higher kind of decorative art within easy reach. If glass doors and panels could be ornamented with large-sized photographs of appropriate subjects, they would soon supplant the daubs that at present too frequently appear in such situations. Then, again, as regards our stained-glass windows, photography will yet have an important part to play. The kind of art at present in use is excessively costly. I would not wish publicly to say anything by way of depreciating works which are so highly paid for, and on which so much labor has been bestowed, but to a society of photographers the case is different, and to them such works, compared with photographs, are, in most instances, merely barbarisms. In past ages, no doubt, such work served its purpose, and as a relic of the past it deserves our regard; but appropriate photographic transparencies of well-chosen subjects, delicately tinted by colored glass placed behind them, would be far more effective and beautiful than the incongruous and improbable-looking pictures at present too often seen occupying prominent situations. Let us have such pictures to take the place of the frequently ill-drawn and glaringly-colored figures which have long been the representations on stained glass. Colors are much alike in all ages, and though the scenes represented are long past, this ought to form no reason that modern art should still be tied down to imitate the colors and designs of a past age. The fact seems to be that glass painting is an art which, as we had borrowed it from our ancestors, we were afraid to improve through dread of innovation. As to future advancement, I am very sanguine in the progress of the photographic art as regards the size and boldness of effect of the pictures. It is only in large gallery paintings or in great dramatic pictures, as seen in churches and other public buildings, that the art gained power to make its deepest impressions on the mind. The painted ceilings become a part of the architecture, and produce an effect on the spectator which could never be obtained by small work. Photography has been hitherto confined to small work, such only as could be seen by close inspection and dependent for its effect upon minutiæ of detail, and it is only very recently that it has attempted to reach a grander development and to produce results which large size and breadth of effect alone can give. It would now seem that small pictures, such as those exquisite little cards or stereoscopic views now so well known, can be enlarged to almost any extent. No one can doubt but that this is a great step in advance, and that photography will thus be enabled to take up a more extended and perhaps a higher position."

The "Roanoke's" Engines.

The recent statement, to the effect that this ironclad's engines are failures, is very broad and covers altogether too much ground. The facts are simply these, Mr. Alban C. Stimers introduced a drag crank on the main shaft in the place of the usual solid forged crank; this feature, old in design but new in its adoption, in the present engines, has been found impractical and will have to be removed and replaced by a shaft of the usual construction. This will detain the ship several weeks, if not months, from active service, as the construction of a crank shaft of the dimensions required by the *Roanoke's* engines involves much time. Several eminent engineers, we are informed, protested against the modification referred to, but Mr. Stimer's influence prevailed, and hence the results set forth. It is a matter of regret that the occurrence should have taken place, as the battery has already cost the country a large sum and her services are needed at once.

Improved Patent Horse Rake.

This engraving represents an improved horse rake, and was designed for the purpose of obviating many of the objections hitherto attaching to those machines. It is light, portable and easily moved from place to place. The dashing manner in which our artist has depicted the farmer proceeding to the theater of operations aptly illustrates the peculiar features of the machine above alluded to.

HOMAN'S PATENT HORSE RAKE.

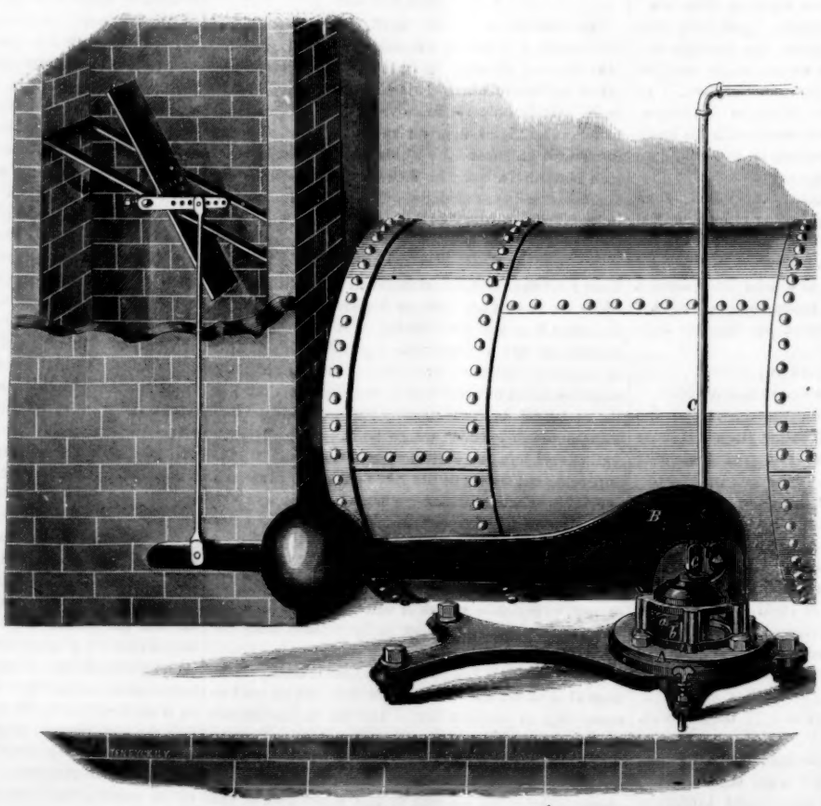
The two large wheels have a cylindrical portion projecting from the inside of each hub, and the two ends, A, of the thills, B, have metal eyes which bear on the cylindrical parts above mentioned. The wheels run on the axle-tree, C, which is capable of being vibrated in the wheels by the lever, D, attached to it by a metallic joint, and connected with the pins on the side of the seat when it is desired to raise or lower the rake teeth. The teeth themselves are bent to a suitable form and secured to the axle, C, by nuts and collars on either side; they pass through the axle and are secured in the manner described. The rake is governed from the driver's seat, by the lever, and the distance at which the teeth work from the ground can be altered at will. It will be seen that the driver's seat is supported on the wheels, and instead of forcing the rake teeth into the ground, will allow it to be freely moved, so as to regulate it as required. In the engraving the rake is shown hooked up out of the way, so as to be transported from place to place. These machines are said to be very efficient, and they are certainly simple enough in construction to entitle them to much consideration on this score alone.

A patent for this invention was procured through the Scientific American Patent Agency, by S. J. Homan, of Dowagiac, Mich., on May 7, 1862; further information can be had by addressing C. B. Holmes, at that place.

Steam and Fire Regulator.

The importance of regulating the draught, and through it the fires, in steam-boiler furnaces cannot be over-estimated as a matter of economy. Too often coal is consumed that might have been saved had proper attention been given to this subject.

Herewith we illustrate an apparatus which exercises complete control over the draught and regulates the same to suit the occasion. It consists of a cast-iron chamber, A, in which is fitted a rubber diaphragm, *a*. This diaphragm has a cast-iron head, *b*, resting on it, which is provided with the spindle, *c*, and through it connects with the lever, B. On the opposite side of the chamber is an orifice for the entrance of the steam-pipe, C, nearly on a line with that occupied by the pet-cock seen in the foreground. The extreme end of the lever is connected with the chimney (part of which is broken away to show the damper), and the apparatus otherwise explains itself. The operation of it is as follows:—When steam enters the chamber it expands the elastic diaphragm and raises the lever, which in turn closes the damper. Should the pressure in the boiler fluctuate, the result is immediately apparent in the action of the lever; and whether the steam increases or decreases in force, the motion of the diaphragm corresponds to it and regulates the draught accordingly. The desired pressure of steam in the boiler can be obtained by moving the weight in the lever to or from the center. These regulators have been in use for a long time and give universal satisfaction. All the bearings are knife edges, as in the best platform scales made, and the apparatus is comparatively frictionless. There are no less than two thousand of them now in use, and the proprietors of the patent refer to the owners of them for testimonials regarding their efficiency. Patented on Jan. 3, 1854, by Patrick Clark, of Rahway, N. J., and further information may be obtained by addressing Clark's Patent Steam and Fire Regulator Co., at No. 5 Park Place, New York. [See their advertisement on another page.]



CLARK'S PATENT STEAM AND FIRE REGULATOR.

Gold Quartz.

A new method of depriving gold ores of sulphur has been introduced at the mines of Pike's Peak. It consists in reducing the ores to fine dust, then forcing the dust by a draft through a flame of pine wood. The furnace used is a square brick structure, with a grate about three feet wide by four in length, and three feet high, in which a fire of common pine wood is built. The flame from this fire-place escapes into a chimney built in the shape of a muffle and, instead of rising upward, runs down toward the lower floors at an angle of forty-five degrees. The tube containing the ground quartz enters this muffle-shaped chimney at its upper end, just were the blaze from the furnace enters, and the strong current carries the flame through its whole length. There are several round holes, an inch or two in diameter, at intervals of three or four feet along both sides of the chimney. Through these, when the apparatus is in operation, a further supply of air than that furnished by the blower is sucked in and assists in decomposing the sulphur contained in the ore. In passing down the flue or chimney the pulverized ore is blown through a jet of flame, as dust, for a distance of about twenty feet—the length of the flue—and each particle being separate, is surrounded by air and a strong flame, and it becomes red hot, giving off its sulphur, arsenic and other volatile constituents. After passing down the flue, it falls into a receptacle of brick-work, whence it is raked out upon an earthern floor to cool. The ore now presents about the same appearance as that burned in a reverberatory furnace—a brick red. The amalgamating machinery is simply an arrastra about eight feet in diameter, with a stone bottom and drag-stones. This is a very novel process, and three times more gold, it is stated, are obtained by it than by any of the old processes.

Sulphur, arsenic and iron in quartz prevent, in a great measure, the mercury from amalgamating with the gold.

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MALLEABLE IRON AND STEEL FROM PIG IRON.

What is called the "Bessemer process" for converting pig iron into steel and malleable iron is generally understood to consist in forcing currents of air through molten pig metal as it is run off from a smelting or a cupola furnace. By this process it is held that the oxygen of the air-blast combines with a portion of the carbon which exists in excess in the pig iron, removing it in the form of carbonic acid gas. The extraction of a small quantity of carbon from the crude metal still leaves sufficient to form steel, which is a compound of iron and carbon; the removal of a larger portion of carbon reduces the metal to malleable iron. Immediately after this process had been prominently brought before the public, some years ago, it was noticed that while good steel was produced at one smelting, very inferior steel sometimes resulted at the next smelting, although the operations had been conducted in precisely the same manner. So much uncertainty was felt respecting the quality of steel and iron thus produced, that the process was held to be impracticable in its application on a large scale. But Mr. Bessemer devoted himself to the subject of investigating the causes of uncertainty in securing uniform results, and at last he worked out the problem, for his process is now practiced in England, Sweden, Germany and France, and also used in the works of Corning Winslow & Co., near Troy, N. Y. Thousands of tuns of steel are made annually by it in Europe and its use is rapidly extending. It was found by Mr. Bessemer that different qualities of pig iron gave different results, and that workable steel could not be produced by the mere passing of air through all kinds of molten pig metal. It was observed that although the excess of carbon was removed by the blast, other impurities, such as phosphorus and sulphur that are common to inferior crude metal, remained. The next course was to experiment with the best pig iron, the quality of which was known to be uniform. With Swedish charcoal pig-iron uniform success attended every effort, and similar grades of steel were produced at every smelting. Thus, in a general sense, the process was perfected for practical application. With the best brands of Swedish pig iron good qualities of cast steel and bar iron for forging are now asserted to be made by this process. The loss of weight in the material in converting the crude iron into steel is from 12 to 15 per cent; in converting it into bar iron, from 18 to 22 per cent. A tun of molten pig iron may be converted into steel in seven minutes—the pressure of the blast used ranges from seven to twenty pounds on the inch, according to the quantity of metal smelted. About 1,200 cubic feet of air is required for refining a tun of metal, and a better result is obtained with this than a smaller quantity. It is indispensable to the production of good steel and bar iron, by this system, that the best qualities of pig iron be used; yet coarse steel, called "semi-steel," and common malleable iron may be made from inferior pig iron, by using a small quantity of manganese and Franklinite pig iron mixed with it.

As it is now better understood, this peculiar refining process commends itself to many of our iron manufacturers. By a simple and not very expensive arrangement of apparatus and mechanism they may produce medium cast steel and bar iron from pig iron at a small cost compared with the tedious modes now practiced, consisting of several re-heatings involving a great expenditure for fuel and mechanical labor. The magnetic iron ores are abundant in Maine, New Hampshire, Massachusetts, New York, New Jersey and other States, and from these, when smelted with charcoal, pig iron can be obtained, similar in every particular to the Swedish brands. Our natural supplies of this ore are inexhaustible, and with anthracite coal it may yield superior pig metal, as that fuel does not contain sulphur like the coke made from bituminous coal. This is a subject of vast importance. Iron is now superseding wood in every department of engineering and mechanism, and every effort should be made to improve its quality and reduce its cost. The demand for it seems to increase faster than the supply. In house-building, bridge-building and ship-building it is fast becoming the leading material, and there can be no question of the fact that, with an abundant supply of cheap steel, all the useful arts will be benefited and advanced.

A PNEUMATIC POST.

The instantaneous connection of remote points by mechanical means has become one of the necessities of the age. The stage-coach has had its day and it has been superseded by the locomotive, and even the business communication between cities, at one time easily transacted through the mails, has been vastly aided by the introduction of the telegraph. This latter medium is available for messages only, and if we desire to transport material we must, in the present state of things, have recourse to the rails again. Science provides a remedy for the matter in the adoption of the pneumatic post; and packages, propelled by atmospheric pressure, are now safely and swiftly transported from point to point in England. The question arises how far these lines are capable of practical development, and what degree of economy exists between the substitution of air as a propelling agent for the power of steam? These questions we cannot answer decisively, but they can be readily solved by experiment. The principle of the pneumatic post consists in applying the weight of the atmosphere to a sliding or rolling object in an exhausted tube; and it was formerly supposed, in the earlier experiments on this subject, that the degree of mechanical accuracy which was necessary to the perfect working of so subtle an agent as common air, would materially interfere with the utility of the scheme. It has been found, however, on the English lines at least, that mathematical accuracy was wholly unnecessary and that the inherent difficulties were over-estimated. It must be borne in mind, however, that the English line of pneumatic post is quite short and is worked at what we consider a low rate of speed, that is, from 20 to 30 miles an hour; we do not state this positively, but we have been so informed. At such speeds there can be but little advantage derived over the ordinary means of communication, since the express trains, running at 40 and 45 miles an hour, would outstrip the pneumatic post. The only way in which a line of this kind could be rendered superior to the ordinary methods of transportation would be in having the speed of the package transmitted under control, so that greater or less rapidity could be given to it, as desired. Where the working pressure is a fixed quantity, as in the case of an exhausted tube, it is manifest that the means of regulating the velocity of the goods forwarded must be very uncertain. If, however, we modify the apparatus, so that instead of depending on the simple pressure of the atmosphere against an object *in vacuo*, we not only obtain a vacuum but also condense the air behind the package to be driven through the vacuum, we shall have a force limited only by the extent to which the air is condensed, minus the difficulties existing in the tube and car. These difficulties will be apparent to all who have ever given attention to the subject.

An apparatus on this principle has been already experimented with. We recently saw a short line at Carhart and Needham's extensive melodeon manufactory in Twenty-third street, this city; and no serious objections were apparent to us in the general plans of the inventor, Mr. Needham. The idea (we are at liberty to make it public) is simply an endless tube having relays of exhausters, most suitable for the object in view, at various intervals. The car containing the package is placed in the tube, and the exhausting apparatus set in motion. The package constitutes a diaphragm or partition in the tube, and the air is removed from before it and delivered behind it by the same machine. This is simply the idea and it worked well in the imperfect wooden model which we have mentioned. The proper means were pointed out to us for checking the package car at the station, and for removing the contents at any station almost instantaneously. This scheme is perfectly feasible and one that should be tried on a larger scale. Operated almost entirely under ground, the pneumatic post is open to none of the objections which apply to express companies generally, and there need be none of those expensive and cumbrous vehicles which are used by companies of the kind last-mentioned. English enterprise and energy have outstripped us in this respect, and there is at present a line of pneumatic post at work in London. Steps ought to be taken in this matter and the subject looked at in all its bearings at once, so that if there are as many advantages to be derived from it as there would seem to be, the people should have the benefit of them.

INTELLECTUAL TOOLS.

It is a matter of very great surprise and regret to us to hear, as we have heard, mechanics exclaim when recommended to take this or that mechanical work—"Oh! I don't want that," or "I guess I can't afford it now," and kindred objections mistimed and ill-applied. These men were not, as many would suppose from their exclamations, ignorant; on the contrary, they eagerly sought all means of obtaining practical knowledge of their professions and were emulous of the first position as artisans. If their tool-chests were examined the result would disclose a complete assortment of the most improved instruments in use, and a great many others not generally known, that the ingenious makers had contrived for special needs and ends. When the hours of labor were transpiring, the men of whom we speak were diligent at their duty, but when their work was done those men lost sight of every thing and let the "shop" go until the next day. A proper relaxation of the mental powers is just as necessary to perfect health as rest to the over-taxed body, but an utter neglect of mental culture brings its own punishment with it.

It is impossible for any workman to keep up with the spirit of the age unless he consults such works as are published for his special benefit. If he ignores utterly and wholly the discoveries of men of science at home and abroad, he alone will be the loser by it. A mechanic may be very skillful, intelligent and apt at his calling, but he does not combine all the mental energy of the period, and however enterprising he may be, there are others, his equals and superiors, who might benefit him if he would only lend an ear to their teachings.

There are undoubtedly many seasons in the life of an artisan, as there are occasions in the personal history of every individual, when he feels straightened in his circumstances and unable to afford the small sum necessary to purchase intellectual aliment. But if we look upon these papers, books, or whatever form the knowledge is issued in, as *tools*, we must admit the justice of purchasing them at some sacrifice of needless gratification. On the one hand we see a mechanic furnishing his mechanical *repertoire* with all modern appliances wherewith to prosecute his business successfully, but on his intellectual needs he expends not a cent. We have all read the fable of the hare and the tortoise; how the former challenged the latter to a race, and, confident of his ability to outstrip his toiling antagonist, set out in the morning, ran awhile, then sat down and slept. While he slept the tortoise, slowly but certainly, devoured the way and reached his goal just as the hare came panting up too late. The brilliant but unlettered mechanic is the hare who runs his race in the heyday of his powers, while the less gifted individual, who depends not alone on the work of his hands, but unites brain with muscular exercise, achieves his end not less quickly and much more certainly, than he who relies blindly on mere dexterity. It is only by a proper union of intellectual cultivation with man-

ual dexterity that the most eminent mechanics have succeeded; and those who aim at renown but despise the road thereto will do well to remember this fact.

THE IRON-CLADS AT FORT SUMTER.

Now that the smoke of battle has cleared away, and the fearful cannonading at Fort Sumter, which so annoyed the twittering reporters has ceased, we may review the event dispassionately and with reason; at least, in so far as it concerns the offensive and defensive powers of the *Monitors*. The daily press, through its accredited representatives, made great haste to assure the public that their favorite batteries, those in which (not unwisely) they placed the greatest confidence, were altogether unsuitable and, in fact, were not available against heavy artillery. At the time we were compelled, against our judgment, in view of the overwhelming representions of these self-constituted authorities, to accept as a fact that we were beaten in the contest and compelled to retire from the fort by sheer force alone. Even at the time of the action, and in days supervening, that portion of the press of the country who criticized the conduct of the attack were immediately frowned down, and, to say the least, sent to "Coventry" by other papers, whose interests or opinions led them to sustain the part our commanders took on that occasion. We were treated with graphic accounts of the effects of the rebel shot on the *Monitors'* turrets, and it was asserted that the most destructive shot that was fired on the occasion struck the *Passaic's* turret near the top, and after scooping out an immense portion of it, broke all the eleven plates and spent its force on the pilot-house, which it very nearly demolished. This is the spirit, if not the exact letter, of the accounts furnished. Now, we have examined the turret of the *Passaic* since her arrival here for repairs, and with all due respect for the reporter's rhetoric and his sensatorial paragraph, we must say that it is *bosh*. The shot *did* strike the turret, *did* scoop out a portion (which might weigh 25 pounds), and did strike the pilot-house with great force, besides breaking the turret plates in its passage. But what of all this? When iron meets iron (as when Greek meets Greek) then comes the tug of war, and it is not to be supposed that a shot moving at the rate of say 1,500 feet per second will strike an iron structure in its weakest part and not damage it.

The simple facts of this loudly-trumpeted performance of the rebels are that the shot which struck the *Passaic* did not endanger her safety in the least; for all the effect they had on her externally she might have been fighting away till this hour and, in reality, have been none the worse for it. We have examined the shot-marks on the *Passaic*, said to be sixty-eight in all, though we did not count them, and find an accurate representation of the Whitworth shot impressed in the turret in many places. If these much-boasted projectiles are not able to do any greater damage than they did, we may safely defy all the English iron-clads and their armaments. The Whitworth shot or *fac-similes* of them, in a majority of cases struck sideways; they reached the turret in all possible positions and show very poor shooting on the part of the rebels. There were several bolts driven in on the turret which injured the persons within; but the majority of the indentations and scars could be covered by and filled with a common tea-saucer. These are, simply, the "terrible" effects of the rebel shot. Now what person possessing ordinary judgment and at all conversant with the properties of iron, could conscientiously report that the *Monitors* were unable to cope with artillery? For our own part we assert that the favorable opinions hitherto expressed in regard to those vessels have been greatly strengthened, and we do not hesitate to say that, with the present artillery, they can successfully defy any fort or any iron-clad afloat; so far as the impregnability of their armor is involved, we would not hesitate an instant to confide our personal safety to the thickness of their walls. We have no desire to disparage any official in connection with this subject, but so far as the *Monitors* being disabled (except temporarily) in the late attack is concerned, we must avow our utter skepticism. The *Passaic* is the only iron-clad sent North; *ergo* the *Passaic* must be the one most injured. What injuries are those that merely indent iron plates, and what terrible shot those must be which strike and leave no sign internally to tell the story of their spent force and impotent rage! We think a much better sensational report could have been made on the occasion by writing the facts: How the minions of the rebel Government did their utmost to demolish the *Monitors* and how signally they failed; how, backed and aided by English capital and skill, they hurled their powerful projectiles against the impenetrable iron-clads and were worsted in the encounter; how grandly those little vessels withstood the enemy's fury; and how, saving one poor little eggshell craft, they bore unflinchingly the most furious cannonading that was ever known, in the shortest space of time. These features would have been worth commenting upon, and were we in the rebels' situation we should prefer a naval assault to take any shape but that proceeding from a fleet of those vessels. Properly handled and armed they can defy any ship now floating; and improvements are being made which will render their utility past all doubt.

We have considered in this light merely the question of the impregnability of the *Monitors*—supposed to be the first requisite of a modern war-vessel; that they have other objectionable features we do not deny, but taking them as representatives of fighting machines—the greatest offensive power in the very smallest compass—they cannot be excelled, and the nation does well to estimate them among its staunchest defenses.

It is singular, in viewing the effects of the shot on the *Passaic's* turret, to note that they exhibit none of the characteristics of a plunging fire. The shot that "scooped out a tremendous portion" of the top of the *Passaic's* turret struck the pilot-house at nearly the same hight, showing that it must have been fired at point-blank range, or nearly so. So also those that struck the base of the turret—no marks are visible on the deck which would lead the observer to suppose that the missiles were fired from such an elevation as the barbette of Fort Sumter; and we conjecture that the batteries on Morris Island and Battery Bee must have taken a hand in the engagement, although we think it is stated in the reports that those batteries were silent. We hope, when the *Monitors* attack Charleston again, they will go there with the intention of doing their duty, and not come back with school-boy tales of monstrous torpedoes. The sluggard will not plow by reason of the cold; and the fool saith "There is a lion in the streets, I shall be slain without!"

The Income Tax.

We copy the following explanation of the income-tax law from the *Legal and Insurance Reporter;* the whole matter is very simply explained, and will be found useful to many of our readers:—

"Every person must make a return of the receipts of his business, or of his property of every description. Guardians, trustees and administrators must do the same in their character as fiduciary agents. The assessors decide what deductions the law allows, but assessments are submitted to examination, and appeals may be made. If persons refuse to make a statement of their income, or the statement is not deemed to be true, a list will be made on the best information the assessors can obtain, subject to the oath or affirmation of the persons assessed, as prescribed by the law. Mechanics, manufacturers and merchants will return the whole amounts of the avails or revenue of their business, and a statement of the expenses of the same for labor, material, &c. Co-partners will return their share or interest in the co-partnership income; corporators, the amount of profits, whether in the form of dividends or otherwise. Salaried men will return the full amount of the salaries received. A return must be made of the income or dividends derived from stock in any bank, insurance company, savings institution, trust company, railroad, railroad bonds, steamboat, ferryboat, or bridge, between January 1, 1862, and August 31, 1862, inclusive. The net gains or profits of manufacturers must be returned. All income received from bonds, mortgages, notes, stock in gas companies or manufacturing companies, during the whole of the year 1862, is to be returned and taxed. The deductions made from the aggregate income of any person, are $600 in the first place; State and local taxes of the calendar year, January 1, 1862, to December 31; interest, dividends, &c., of stock in banks and other moneyed corporations, from which the statute tax of three per cent. has already been deducted or retained, *i. e.* since August 31, 1862. Receipts derived from advertisements on which a duty shall already have been paid; the rent actually paid for rent of a dwelling-house or estate, the residence of persons assessed. The value of rent of house occupied by owner is not deducted. The amount of hired labor, and value of the board of such labor. Persons receiving rent are entitled to deduct the cost of repairs, insurance and interest on incumbrance upon rented property. The cost of extraordinary repairs, new structures, &c., will in no case be deducted."

DEATH OF BENJAMIN PIKE, SEN.

One of our old and much respected citizen mechanicians has lately gone "where the weary are at rest." Benjamin Pike, Sen., the well-known philosophical instrument-maker, died at his residence in this city on the 2d inst., at the advanced age of eighty-six years. Since his decease we have gleaned some interesting facts respecting his life and character. Mr. Pike was born in London in 1777, and came to this country in 1798, at the age of 21 years. In 1805, he established himself in business, in this city, as an optician and manufacturer of mathematical and philosophical instruments, and he soon became widely known for his mechanical skill. He was an enthusiast in his profession and gave it his undivided time and attention. His ambition was to serve the public with instruments equal to the increasing demands of science. He was a careful and diligent student; and after the labors of the day had ended he thoroughly informed himself of the researches and advance of natural philosophy. For half a century his store was the headquarters of scientific men, and he was the companion of Fulton, Eckford and others whose genius has done credit to our country. He manufactured models and instruments for them, and he was really the great pioneer manufacturer of philosophical instruments in America. Several years since he purchased a farm, a short distance from the city, which afforded him much quiet pleasure in his declining years, but to the last he manifested a deep interest in all things connected with skillful and ingenious mechanism. In manner he was unobtrusive and retiring, a man of few words but large ideas, and a consistent Christian.

Assistant War-Secretary Watson.

"The Assistant Secretary of War, Peter H. Watson, went to the State of New York to-day, to find in the quiet of a Delaware county farm, the health and strength which he has so prodigally wasted in the service of the Government. When the history of the gigantic struggle to save the great republic is written, mention will be made of those men who, noiselessly and in the recesses of departmental bureaus, have, with complete conscientiousness, great intelligence and that rare courage which dares pursue a line of duty through obloquy and opposition, organized armies, created navies, guarded the Treasury, purified administration and repressed domestic treason. Among these none will have a more honorable or enduring fame than the Assistant War-Secretary, Watson."

[We copy the above from a special dispatch of the New York *Times*, and can heartily endorse these deserved words of commendation. Mr. Watson is one of the most laborious and faithful men in the service of the Government.—Eds.

FAST NAVAL STEAMERS.—Two fast steamers are to be built at once for the Government; capable of overhauling any foreign ship now afloat. Mr. Delano, the naval constructor at this port, and Mr. Henry Steers of Greenpoint, are to furnish each a model, while Mr. E. N. Dickerson is to design the engines. The vessels will be about 300 feet in length and 8,000 tuns burthen.

IT is stated that an Irish girl, an operative in Smith's paper mill, Lee, Mass., recently found five genuine $1,000 Treasury notes in the paper rags, and another girl in another mill, in another lot of rags, found a gold chain valued at $60.

PHILADELPHIA receives $400,000 per annum for water rents.

RECENT AMERICAN PATENTS

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Call for Telegraphs.—The custom now generally adopted in this country, in electric telegraphy, of reading intelligence by the sounds emitted by the instruments in their operation, has rendered it difficult, if not impracticable with the instruments at present in common use, to transmit intelligence with any degree of secrecy, because the instruments in all other offices or stations on a line of telegraph, besides that to which the intelligence is to be transmitted, operating in unison with the instruments at that station, produce the same sounds, and may be heard by other persons than the confidential operator, who may be familiar with the telegraphic alphabet. This difficulty has been, in a great measure obviated by means of the receiving instrument, which constitutes the subject matter of Letters Patent, No. 1,850, dated July 23, 1861; but it is essentially necessary that the several offices or stations on a line should have means of communicating with each other by sounds audible at some considerable distance from the instruments, so that the operator at one office or station may thereby draw the attention of another operator at any other office with which it may be desirable to communicate; to this end this invention consists in an instrument which may be termed the "silent message call," from which, though it is capable of calling the attention of the operator, messages cannot be read, because the electric pulsations produced in their transmission are too frequent for its action, but which, when the pulsations are less frequent, will act in accordance with them and thereby produce sounds sufficiently loud to be heard at a distance greater or less according to the strength of the electric currents, and which sounds will then be intelligible, and are intended to be used to call from one office or station to another. Alexander Bain, of New York city, is the inventor of this improvement.

Key for Electric Telegraphs.—Most persons practically familiar with the operation of the Morse telegraph instruments can read the intelligence by the sounds, not only from those instruments used for receiving the intelligence but from the key commonly used for its transmission, and hence it has been very difficult to preserve secrecy, not only at the offices or stations where the intelligence has been intended to be received, and through which it has passed, but at that from which it has been sent. The object of this invention is to render the operation of the key inaudible, or so nearly so as not to be heard by any one not in very close proximity to it; and to this end it consists in a certain construction of the key, whereby the surfaces of contact, by which the circuit is opened and closed, are caused to come together with a sliding instead of with a percussive action. The inventor of this improvement is Alexander Bain, of New York city.

Dresser Brush.—This invention is an improvement upon a dresser brush which has been in universal use for the last fifteen or twenty years, and by it a decidedly more valuable brush is produced at a less cost. By the original patent a considerable portion of the best part of the bristle was necessarily used in setting; by the present improvement a large portion of this part of the bristle is saved and consequently the quality of the bristle which comes in use for dressing purposes, is superior to that which is found in the brush made by the old method. The present invention relates to a simple device for holding the bristles for the purpose of dipping their butt ends in the pitch or cement used to secure the same to the blocks, and also to a peculiar manner of fastening the strips of wood between which the butt ends of the bristles are secured. Samuel Taylor, of East Cambridge, Mass., is the inventor and manufacturer of this brush.

Manufacture of Metallic Zinc.—This invention consists in submitting the oxide or other compound of zinc, either alone or mixed with coal or other carbonaceous matter used as fuel in charging the mufflers or retorts in which the reduction to the metallic condition is effected, to pressure or pressure and friction combined, whereby the material is brought to a condition in which it is better adapted for the charging of the muffles or retorts, that is to say it has imparted to it increased compactness and gravity, which enables the muffles or retorts to be charged with a much greater quantity than when the material has not been so treated, thereby not only saving time in the process but wear and tear, and the breakages of the muffles or retorts, which often occurs by cooling when charging, such breakage being a serious loss, as the muffles or retorts are expensive. G. T. Lewis, of Philadelphia, Pa., is the inventor of this improvement.

Apparatus for working Ships' Pumps.—The principal object of this invention is to provide for the pumping of the bilge water from all parts of a vessel, whether on an even keel or careening over to one side or the other; and to this end the invention consists, first, in leading pipes from various parts of a vessel to one common air-tight chamber with which the pump is connected, thereby enabling the water to be drawn directly from all parts of the vessel by one or a set of pumps. Second, in the employment within such a chamber of a valve or valves, so applied under the control of a hanging weight as to cut off from communication with the said chamber such of the pipes leading from different parts of the vessel as may have their mouths left uncovered with water by the change of position of the vessel and to open to communication with the said chamber such of the said pipes as may have their mouths covered with water, thereby insuring the pumps drawing water while any remains in the vessel, and preventing them from drawing air while any water remains. F. R. Boettner, of Chicaco, Ill., is the inventor of this pumping apparatus.

An Ingenious Counterfeit.

Before the war a certain kind of fine sheeting, made in New England by the Lonsdale (R. I.) works, was very popular, and extensively patronized by the Southern merchants. Since the war broke out they have been unable to get them. Among the merchandise captured on board of the British prize steamers off Charleston, trying to run the blockade, and brought to Philadelphia to be sold, was found a lot of goods made by the English manufacturers in exact imitation of the Lonsdale article, bearing a label which is a perfect counterfeit of the New England label, except that for Lonsdale is substituted the word "*Lansdale.*" No such works exist in England, and the goods are palmed off as the American make, upon Southerners who have been for two years swearing that they would never wear Yankee goods if they could get any other. It seems that even their English friends are obliged to counterfeit the Yankee labels before they can get them to buy English sheetings.

HONORABLE EMPLOYMENT.—Let young men remember there is nothing derogatory in any employment which ministers to the well-being of the race. It is the spirit that is carried into any employment that elevates it or degrades it. The plowman that turns the clod may be a Cincinnatus or a Washington or he may be a brother to the clod he turns.

Magazines and other Publications received.

PRACTICAL NOTES ON THE STEAM ENGINE, PROPELLERS, &c. By W. H. King. Published by D. Van Nostrand, 192 Broadway, New York.

This volume is, as its title purports, a treatise on the steam engine and its details and management in general. The work is invaluable to engineers who desire to perfect themselves in their profession, and to all others who wish to become acquainted with the mysteries of the mechanical action of steam. Expansion valves and cut-offs, the study of the indicator, boilers, materials and the elements of machinery, are all treated on in separate chapters, and we can confidently recommend the book to persons of every grade of mental ability for the simple and unaffected style in which it is written. The publisher, Mr. Van Nostrand, has issued the work in very handsome binding and printed it with clear type on fine paper, so that it is a decided acquisition to any library, and a valuable addition to the scanty stock of standard mechanical works. The present is the fourth edition, and has been revised by J. W. King, C. E., U. S. N.

LEAVES FROM THE DIARY OF AN ARMY SURGEON. By Thomas T. Ellis, M. D. Published by John Bradburn, New York.

This book contains incidents of field, camp and hospital life—the author's experience beginning at Camp Washington, on Staten Island, in October, 1861, and ending with the removal of General McClellan after the sanguinary battle of Antietam. The book is very cleverly written and forms a very readable narrative, but it is marred by the discussion of matter upon which the people are divided in opinion and in regard to which the author might just as well have kept silence. The otherwise valuable character of the book is almost spoiled by this unfortunate admixture of matter. Price $1.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING MAY 12, 1863.

Reported Officially for the Scientific American.

*** Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

38,455.—Breech-loading Fire-arm.—Wales Aldrich, Cleveland, Ohio:

I claim, first, the wedge-shaped body, D, rack, E, and pinion, F, in combination with the rigid spur, K, and slider, L, when these parts are constructed, arranged and operated substantially as and for the purpose specified.

Second, I claim the herein-described device for bringing the piece to a half-cock by the movement of the body, D, as set forth.

38,456.—Register for Horse Cars.—C. B. Angell, Coventry, R. I.:

I claim, first, the step, B, attached to the shaft, K, in combination with the lever, g g g, arranged and applied substantially in the mode described, for the purposes set forth.

Second, The combination of the gates, C, with the wheels, b, the racks, c, or their equivalents, with the beam, d, and the spring, l, arranged substantially as described for the purposes set forth.

Third, The mode of unlocking the beam, d, by the rod, h'', combined with the lever, k, and arm, k', acting on the spring, l, or their equivalents, arranged substantially as described for the purposes set forth.

Fourth, I claim the lever, h, with its weight or spring, in combination with the lever, g, shaft, K, and levers, P and N', arranged substantially as described for the purposes set forth.

Fifth, The shaft, No. 7, in combination with its arms or cranks connecting it with the racks and wheels, arranged substantially as described for the purposes set forth.

Sixth, The arrangement of the levers and rods, 12, 5, 4 and 3, in combination with the spring, 2, constructed substantially as described for the purposes set forth.

Seventh, The shaft, R and P', their cams, S and S''', their connections with the beam, d, or shaft, 7, arranged and applied substantially as described for the purposes set forth.

Eighth, The drums, Z and Y, constructed and placed as described for the purposes specified.

Ninth, The mode of throwing the drum out of gear by the action of the shafts, U' and V', and the levers, n n', and the parts connected therewith, arranged substantially as described for the purposes specified.

Tenth, The guides, m m', for the purposes set forth.

Eleventh, The combination of the levers, R and N', with the rods, S' and T, and their intermediate and appurtenant parts, arranged substantially as described for the purposes set forth.

Twelfth, The combination of the lever, P, with the springs, rod, wheel and hammer connected therewith, arranged substantially as described for the purposes set forth.

Thirteenth, The combination of the movable step, B, with the drums, Z Y, in connection with the gates, C, through the mechanical contrivances described, or their equivalents, constructed and arranged substantially as set forth for the purposes specified.

38,457.—Lantern.—J. S. and T. B. Atterbury, Pittsburgh, Pa.:

I claim, first, applying a metallic reflector to a lantern surrounded with glass, substantially as herein described.

Second, Making the glass surrounding the lantern, or the lantern glass, the support for the reflector, substantially as herein described.

38,458.—Animal Trap.—G. T. Barker, Pittsfield, Mass.:

I claim the combination of the swing door, B, the buttresses or jambs, c c, and the shelf with the entrance port, d, the whole being arranged and applied together substantially in the manner and so as to operate as specified, the bait being applied to the door.

And I also claim the improved swinging door, as provided, with the bait recess or chamber open in front, as described, or so made and provided with a lateral passage, as specified.

38,459.—Lubricating Composition.—August Bauer, Philadelphia, Pa.:

I claim the lubricating compound or grease produced as hereinbefore stated.

38,460.—Apparatus for working Ships' Pumps.—F. R. Boettner, Chicago, Ill.:

I claim, first, Leading pipes from different parts of a ship or other vessel to one common chamber, C, with which the pump or pumps or suction pipe of the pump or pumps is connected substantially as and for the purpose herein specified.

Second, The employment within such chamber, C, of a valve or valves, so applied in relation to suitably arranged ports in combination with the pipes leading from different parts of the vessel, and so controlled by an oscillatory movable weight as to open communication between such chamber and the pipe or pipes whose mouths are covered with the bilge water and to close communication between such chamber and the pipe or pipes, which, owing to the position of the vessel, have their mouths uncovered by the said water, substantially as herein specified.

38,461.—Machine for planing Oval Moldings.—Francis Brandon, Albany, N. Y. Ante-dated November 2, 1861:

I claim the arrangement with each other and with the pattern, K, and eccentrically rotating face-plate, e, of the self-adjusting cutter, j, and the adjustable cutter, J, the said cutters acting upon the work at right angles to each other, all in the manner and for the purposes herein shown and described.

[The object of this invention is to obtain a machine by which heads and concaves or hollows may be turned or cut on the face of oval frames at one operation, the work being done expeditiously and in a perfect manner; the invention also admits of different-sized ovals being turned or cut with one and the same pattern.]

38,462.—Window-sash Fastening.—E. K. Breckenridge, West Meriden, Conn.:

I claim a spring window-fastener which has its pintle, C, provided with a projection or pin, b, and its case or tube, B, made in two parts and provided with a slot, d, and shoulder or recess, e, as herein shown and described, so that the pressure of the sides of the orifice into which the tube is driven, will suffice to keep the parts together in working order without riveting or fitting, and so that the pintle, on being withdrawn and partially rotated, will remain withdrawn until it is rotated in a contrary direction, all as set forth.

[This invention relates to an improvement in that class of window-sash fastenings or stops which are composed of a pintle and spiral spring fitted in one or both stiles of the sash, and so arranged that the spring will force the pintle into holes made in the sides of the window frame, the holes being made in the latter at different points, so that the sash may be retained at a greater or less hight, as desired.]

38,463.—Shoe-pegging Machine.—W. C. Budlong, Providence, R. I. Ante-dated June 30, 1862 :

I claim, first, The arrangement of the peg-driver and the awl within the slides, b c, so that while they are capable of moving vertically, independently of each other, they shall have a lateral motion in unison, in the manner substantially as described.

Second, I claim the employment, in combination with the peg-driver, of the retarder to control the force of the descent of said driver, substantially as described.

Third, I claim the arrangement of the vertically and laterally moving slide plates, in combination with the cams, so placed as to operate upon said plates from within or between said plates, substantially in the manner described herein.

38,464.—Traction Wheel.—J. R. Cameron, Pittsburgh, Pa. :

I claim the use of vibrating feet, N N N, upon the periphery of a wheel, when constructed in the manner and for the purposes as herein set forth.

I also claim turning up the edges of the plates so as to form a heel and toe, substantially in the manner as hereinbefore stated.

I also claim the use of a double wheel in combination with the vibrating feet turned up at their edges, in the manner and for the purposes as herein previously stated.

38,465.—Trunk.—Lazare Cantel, New York City :

I claim, first, The screw, i, and nut, g, in combination with the hasps or lock attached to the trunk, and acting as specified, to keep the joint together and form a water-proof trunk, as specified.

Second, I claim the spring catch, f, in combination with the said hasp, l, block, m, screw, i, and nut, g, for the purposes specified.

38,466.—Medicine for Piles.—William Carr, Bath, Maine :

I claim the above described composition, as made of the ingredients and compounded in the manner set forth.

38,467.—Ore-washing Machine.—John Collom, Houghton, Mich. :

I claim, first, The employment or use of a cistern, B, divided into two compartments, b b, in connection with the screens, D D, and plungers, E E, and arranged to operate as and for the purpose specified.

Second, Operating the plungers, E E, through the medium of the rockbar, J, and adjustable connecting rod, K, as set forth.

Third, In combination with the rockbar, J, the plunger rods, F F, springs, H, and adjustable thimbles, I, for the purpose set forth.

Fourth, The buttons, o, on the inclined spouts, N N, when the same are used in connection with the screens, D D, as and for the purpose specified.

Fifth, The bars, O O P P Q Q, applied to the screens, D D, so operate as and for the purpose herein specified.

38,468.—Photographic Printing Frame.—G. W. Cook, St. Paul, Minn. :

I claim the construction and arrangement of the four bolts, C C C C, in combination with the springs, G G, and the frame, A, and the lids, B B, substantially as shown and described.

38,469.—Fulling Machine.—Guiseppe M. Coppo, Paris, France, assignor to E. Dams, late of Buffalo, N. Y. :

I claim constructing the trough of a fulling machine in layers or strata of the materials specified and arranged relatively to each other, substantially as described.

I claim the hollow formation of the beaters or mallets by which elongation and extent of acting surface thereof is secured without sacrifice of lightness, substantially as specified.

I claim the manner of employing heat by the introduction of a heated medium between the strata forming the trough, substantially as specified.

38,470.—Camp Table or Stool.—John Cram, Boston, Mass. :

I claim the improved camp table or stool, as made, with the latching apparatus or its equivalent, and the recessed guide grooves arranged and combined as described, with the table top and the two folding sets of legs, applied together, substantially in manner and so as to operate as specified.

38,471.—Scroll Saw-mill.—W. H. Doane, Cincinnati, Ohio :

I claim, first, The metal guide rod, E, in combination with the lower support, F', and the upper support, f, or the equivalents thereof, substantially in the manner described.

Second, Supporting and guiding the upper end of the saw, d, in the metal rod, E, the latter being fixed within an adjustable tube, F, substantially as described.

Third, The combination, with the adjustable tube, F, of the flaring bell-mouthed holder, H, as herein described.

Fourth, The elastic clamping collar, J, in combination with the adjustable tube, F, and metal guide rod, E, as and for the purpose described.

Fifth, The combination of the tube, F, elastic collar, J', adjustable slotted plate, J, and pivot connection, k, substantially as and in the manner described.

Sixth, Making the upright yoke rod, the driving rod for the saw, and guiding this rod in its motions by means of two or more guide boxes arranged above and below the box, C', the whole being combined with the eccentric, C, and saw, d, for giving a positive rectilinear motion to the guide rod, and dispensing with the pitman driver, substantially as herein described.

38,472.—Machine for leveling the Faces of Millstones.—Daniel Drawbaugh, Ebersly's Mills, Pa. :

I claim, first, The shape and construction of the arm, E, with its forked end, G, and adjustable screws, J, so that the rod staff, H, may be regulated and adjusted on either side or at either end.

Second, I claim the shape and construction of the adjustable key, T, as arranged and fastened to the rim, U, of the upper stone or runner.

Third, I also claim the upright tramming frame, A, as herein described, in combination with the movable-pointed dies, N, and circular bedplates, for the purpose of regulating the tramming and to be held firmly to the cock-head, M.

38,473.—Wardrobe.—Ezra Durand, Chelsea, Mich. :

I claim a wardrobe provided with an attached clothes-drying device made and operating as herein shown and described.

[The object of this invention is to combine with a wardrobe, bureau or other similar piece of furniture, a clothes-dryer or device for airing the clothes contained in said wardrobe or bureau.]

38,474.—Engine Piston.—T. S. Dwelley, Charlestown, Mass. :

I claim the improved piston, made not only with an annular space or groove encompassing and being within the periphery of the piston head, but having an annular or centralizer, cast or placed within such groove, and a packing, arranged substantially in the manner and for the purpose as described.

I also claim the combination of the auxiliary groove, f, and the retaining projections or arms, l l, with the packing ring groove and with the joint lap or breaker of the packing ring, the whole being arranged and so as to operate together, as specified.

38,475.—Beehive.—R. G. Emerson, Fair Haven, Ill. :

I claim the application to beehives of a concave block or strip of wood or other materials, constructed with an internal groove and sliding bar, substantially as delineated, and for the purpose specified.

38,476.—Lock and Key.—F. A. H. Gaebel, New York City :

I claim a key having two bits, when said bits are curved or stand under an oblique angle with the geometrical axis of the key, substantially in the manner and for the purposes herein described.

I also claim, in combination with a double key-bit, substantially as herein described, the annular concave, g, and convex, d, within the lock and in the line of the key-hole, substantially in the manner herein described.

38,477.—Saw-mill.—D. C. Gibbs, Fleetville, Pa. :

I claim, first, The arranging of the sill pieces, B B', with the keys, c, and wedges, d, substantially as shown, to admit of the adjusting of the driving shaft, C, whenever required to maintain the horizontality of the same.

Second, The cross-head, G, formed with a turned cylindrical bar, i, and flattened ends or broad plates, j j, in connection with the plate, I, and wooden, leather or other suitable bearings, k, and the guides, H H, all arranged substantially as herein shown and described.

Third, The plates, s s, formed or constructed as shown, and attached to the upper end of the saw, K, in connection with the plate, v, guides, L L, and the pendent bar, M, having a longitudinal or vertical slot, u, in it to receive the plates, s s, substantially as set forth.

Fourth, The bracket, N, attached to the lender sill, g, provided with a slot, a', and wooden bars, d' d', attached to it, as shown and described, to form adjustable saw-guides, as set forth.

Fifth, The movable or adjustable frame, P, with saw-guides, O O, attached in combination with the bracket, N, and guides, d' d', arranged as herein set forth.

Sixth, The band and toothed wheel, U, in combination with the wheel, B', friction pulley, A', provided with the leather or other suitable material, g', in its periphery, the pulley, A', being placed on an adjustable shaft, W, which has a pinion, k', placed on it, and the wheels, U and B, having a belt, F', passing around them, which is rendered operative or inoperative by an idle pulley, G', all arranged as shown, for communicating a feed movement to the carriage, and gigging back the same, as set forth.

Seventh, Arranging the friction pulley, A', so that it may slide on the shaft, W, and moving said pulley on its shaft by the means herein set forth, when said pulley thus arranged and operated is used in connection with the wheel, B', for the purpose specified.

[This invention relates to an improvement in that class of saw-mills or sawing machines in which a reciprocating saw is used without a saw-sash or gate, and which are commonly termed muley saws. The invention consists in a novel and improved construction and arrangement of parts pertaining to the hanging and the running of the saw, and also to the adjustment of the driving shaft by which the saw is operated. The invention further consists in a novel and improved arrangement of means for operating the carriage on which the log to be sawed is placed.]

38,478.—Plow.—Jacob Haege, Shiloh, Ill. :

I claim, first, Raising and lowering or adjusting the handles, B B, by means of the screw-rod, D, attached to the beam, A, and provided with a nut, F, fitted within a cap or socket, d, which is secured to a bar, E, attached to the handles, all being arranged as and for the purpose herein shown and described.

Second, Adjusting the beam, A, for the purpose of regulating the penetration of the plow, by means of the screw-rod, K, fitted in the plate, J, and nut, L, which are hung on pivots or trunnions, as herein set forth.

[This invention consists in applying or attaching the handles of the plows to the beam in such a manner that they may be raised and lowered to suit the hight of the plowman. The invention also consists in an improvement in the moldboard and share, whereby the latter is rendered capable of being adjusted as it wears by use, and when worn out, admits of being readily detached and replaced by a new one. The invention also consists in an improvement in the clevis whereby the same is made to stiffen the beam of the plow, the latter being slotted longitudinally or made in two parts, in order to avoid springing or warping. The invention further consists in an improvement in the parts employed for adjusting the beam of the plow in order that the latter may be made to penetrate a quarter or less depth into the earth, as may be desired.]

38,479.—Excavating Machine.—William Hamilton, South Paris, Maine :

I claim my improved land excavator, constructed not only with its front axle so made and applied to the body of the carriage or frame, A, as to enable the latter to be tilted laterally on it, but having one or both of its rear wheels applied to the carriage frame or body by means of a lever, or its equivalent, to operate substantially in the manner and for the purpose, as specified.

38,480.—Water-proof Cement for Leather, &c.—Robert Hinshelwood and Charles A. A. During, New York City :

We claim a water-proof cement consisting of the ingredients herein described and mixed together in about the proportion and substantially in the manner specified.

[This invention is intended for the purpose of producing a cement which is of peculiar advantage for joining or patching leather or other similar materials, without sewing, more neatly, quickly and permanently than by any of modes now in use.]

38,481.—Mining Pick.—George Hofman, Scott Bar, Cal. :

I claim, in combination with a removable eyeless pick or point, a metallic head composed of one piece and having wrought upon it a strap or mortise to receive the pick or point, and a tight socket to receive the handle, the several parts being secured to said head, substantially in the manner herein described and represented.

38,482.—Buckle.—O. L. Hopson and H. P. Brooks, Waterbury, Conn. :

We claim a buckle, the prongs of which are made of one piece of wire, and being passed through holes in the center bar of the buckle frame, so bent that the bar connecting the said prongs shall form with them a joint upon said central bar of the frame, all substantially as herein shown and described.

[This invention relates to an improvement in the construction of that class of buckles which are used on garments and articles pertaining thereto, and consists in forming the frame of the buckle of three longitudinal bars connected by bars at their ends, constructed of wire or formed by striking them out of a metal plate by a single operation of a die. The prongs or tongues of the buckle are composed of wire bent in such a manner as to be firmly secured to the central bar of the frame.]

38,483.—Hook-eyes for Wearing Apparel and other Purposes.—Joseph C. Howells, Washington, D. C. :

I claim an eye provided with an embossed surface constituting a shield or guard for the security and protection of the hook, substantially as set forth.

38,484.—Bran-duster.—William W. Huntley and Alpheus Babcock, Silver Creek, N. Y. :

We claim, first, The disk flour-discharger, made fast on the brush shaft, arranged below the dusting cylinder and above the annular plate, D, of the casing, substantially as and for the purpose set forth.

Second, The combination of disk flour-discharger, annular plate, D, and scrapers, n n, substantially as and for the purpose set forth.

Third, The arrangement of the disk flour-discharger, adjustable levers or arms, g g, sliding collar, H, dusting cylinder, E, and casing, A, all united substantially as described.

38,485.—Grain Drill.—A. Ingalls, Independence, Iowa :

I claim the revolving axles, C, rod, M, and plates, m, the lifting plate, J, and gage wheels, K, when all these parts are constructed, arranged and operated as and for the purpose herein set forth.

38,486.—Clutch.—Simon Ingersoll, Stamford, Conn. :

I claim the combination of the following parts, to wit: the inclined planes, f f, disk, d, stationary disk, e, and nut, h, or its equivalent, all arranged and operating together as a friction clutch, in the manner specified.

38,487.—Apparatus for the Manufacture of Cube Sugar.—Gustavus A. Jasper, Boston, Mass. :

I claim my improved machine as not only constructed with the stationary journals, I I, arranged eccentrically to its shaft, L, but as having the molds, i i, &c., plungers, f f, &c., and curved plate, S, arranged and constructed substantially in the manner and so as to operate as specified.

38,488.—Cutter-head for the Wood of Lead Pencils.—Frederick G. Jenkins, New York City :

I claim the arrangement of the plate, B, with the cap, G, for the purpose of forming the mortise to receive the knives or cutters, D, as herein shown and described.

I also claim as new the use of segments saws set stationary in a revolving head for the purpose of grooving and separating the wood, as herein described.

I also claim as new the combination of the several parts in one head for the purpose of planing, grooving and separating at one and the same operation the woods for lead pencil cases.

38,489.—Loom.—Barton H. Jenks, Bridesburgh, Pa. Ante-dated Dec. 14, 1861 :

I claim, first, The tumbler, f, in combination with the oscillating cam, C, or an equivalent arrangement of the same, for the above-described purpose.

Second, I claim pins of an equal length, having one side beveled, in the manner shown, for the purpose of controlling the movements of shuttle boxes in power looms.

38,490.—Hook for Ox-chains.—Frank G. Johnson, Brooklyn, N. Y. Ante-dated Nov. 7, 1861 :

I claim the combination together of the hook, A, and the slotted and weighted tumblers, B B', two or more, substantially in the manner and for the purposes herein set forth.

38,491.—Explosive Projectile.—Job Johnson, Brooklyn, N. Y. :

I claim, first, The cross-bar, g, screw-spindle, k, and internal flange, u, in combination with the cap, f, nut, l, and soft metal ring, o, fitted and acting in the manner and for the purposes set forth.

Second, I claim the spring tube, r, to hold on the detonating cap, s, in combination with the rod, q, and screw, t, that is driven in by the concussion, as set forth.

38,492.—Lamp Chimney.—Wesley L. Jukes, Covington, Ky. :

I claim, as a new article of manufacture, the glass lamp chimney formed with longitudinal corrugations, A, substantially as and for the purpose set forth.

38,493.—Manufacture of Zinc.—George T. Lewis, Philadelphia, Pa. :

I claim subjecting the oxide or other compound of zinc, either alone or mixed with the coal or other fuel, to pressure, or pressure and friction, before charging it into the muffles or retorts, substantially as and for the purpose herein specified.

38,494.—Refrigerator for Steam Engines.—William A. Lighthall, New York City :

I claim, first, Forming apertures in the diaphragm plate, G, as shown, for the purpose of alternately passing the water to be cooled from one side of the apparatus to the other, as described.

Second, The arrangement and construction of the division plates, d d', as shown, whereby the water to be cooled is forced to pass through the different sections of the apparatus and through the apertures in the diaphragm plate, as described.

38,495.—Combined Harrow, Drill, Grass-seeder and Roller.—James P. Long, Osage, Iowa :

I claim the combined machine, supported in front on wheels, Q and at back on the roller, R, and provided with the adjustable suspended harrow, B, adjustable drill frame, J K, and seeding apparatus F G H I, all arranged and operating as and for the purposes herein set forth.

[An engraving of this machine will shortly appear in our columns.]

38,496.—Machinery for cutting Soles of Boots and Shoes.—James W. Maloy, Charlestown, Mass. :

I claim the combination of the reciprocating bed, L, and platen, B, with the stop-bars, a s', the whole operating together and upon the leather to be cut, as above described.

I also claim the yielding plate, P, when used with a horizontal knife-bed, L, and for the purpose of keeping the leather from contact with the edges of one knife, d, as it is fed into the machine over to the other knife, d'.

I also claim the stationary clearer, p, when operating in conjunction with the reciprocating horizontal movements of the knife-bed, as described.

I also claim giving to the knife-bed its reciprocating and intermittent motions by means of the cam, c, pin, b, and crank, k.

38,497.—Hoisting Machine.—William Miller, Cincinnati, Ohio :

I claim, in combination with the described (or equivalent) actuating mechanism, H I, and platform, B, the arrangement of the worm racks, D D', and worm wheels, J J', the whole being combined and operating substantially as set forth.

38,498.—Attachment of Lantern and Reflector.—William C. Owen, Brooklyn, N. Y. :

I claim the combination of a lantern and reflector, when the latter is applied or arranged at the outer side of the former, substantially as herein set forth.

[This invention consists in applying a reflector to the outer side of a lantern in such a manner that the reflector may be readily attached to the lantern and detached therefrom, as required, and a reflector of large diameter rendered capable of being used.]

38,499.—Apparatus for mixing Gases.—William D. Parrish, Philadelphia, Pa. :

I claim the described mode of mixing gases in variable proportions, consisting in the employment of two meters of any ordinary construction for measuring gases: the said meters being so connected by the described mechanism or any equivalent thereto, that the motion thereby transmitted and the relative quantities measured by the meters can be adjusted substantially in the manner and for the purpose herein set forth.

38,500.—Combination of a Chamber Lamp and Lantern.—Charles H. Peters, Cincinnati, Ohio :

I claim, first, The chamber or handled house-lamp, A B, provided with studs, C' C', projecting from the upper portion of the reservoir, and adapted to interlock within the gated-bottom of a lantern case, F, the whole being constructed and adapted for the separate uses of a lantern and a house-lamp, as set forth.

Second, I claim the described arrangement of the guards, H, and apertures, I, for the double purpose of retaining the panes and of deflecting the indraft, substantially as set forth.

38,501.—Clamp for raising Buildings.—Nathaniel Pickard, Rowley, Mass. :

I claim my device or clamp, having its parts, A B C, constructed and arranged with respect to each other as described, and so as to operate in connection with a jack screw, in manner and for the purpose set forth.

38,502.—Stop Watch.—George P. Reed, Roxbury, Mass. :

I claim the combination of the friction spring, k, the brake collar or wheel, l, and the brake or stopper, l, or their mechanical equivalent or equivalents, with the second's pinion, e, and its arbor, g, so applied that the pinion may rotate on the arbor, and relatively thereto, as described.

I also claim the arrangement of the friction spring, k, the brake stopper, l, and collar or wheel, l, with respect to each other and in or relatively to the main or regular train of a watch, as described.

38,503.—Apparatus for wetting Stamps, &c.—R. W. Sackett, Worcester, Mass. :

I claim a device for wetting stamps, envelopes, &c., consisting of a block, A, or its equivalent, revolving in a case, B, containing water, substantially in the manner shown and described.

[The object of this invention is to secure the exact surface of water for wetting stamps, envelopes, &c., without defacing them, by artificial means, instead of licking the same with the tongue.]

38,504.—Manufacture of Steel.—J. C. Schemmann, Hamburg, Germany :

I claim, first, Manufacturing steel in a granular and spongy state by withdrawing it from the puddling furnace at the stages hereinbefore described, and plunging it in cold water.

Second, Manufacturing refined steel by enclosing the granular steel obtained, as hereinbefore described, in iron or steel cases, submitting the same to welding heat, and subjecting the cases and their contents to hammering, as hereinbefore described.

38,505.—Apparatus for teaching the Art of Swimming.—Socrates Scholfield, Norwich, Conn. :

I claim the use of either floats or breathing pipes, when constructed and arranged in such a manner that they may be raised out of the water and rendered useless by the proper motions of the wearer in the act of swimming.

38,506.—Water Elevator.—H. R. Scott, Plainwell, Mich. :

I claim the combination and arrangement of the bevel wheels, b b c c, oscillating shaft, a a, lever, k, crank, o, and drums, h h, substantially as described.

38,507.—Constructing Cars.—Samuel J. Seely, Brooklyn, N. Y. :

I claim, first, Constructing the ends of metal cars of ridged sheet metal, d c c, and of elliptical or curved form and without joints at the corners, substantially as set forth.

Second, The arrangement of the angular guard, J, or its equivalent, in combination with the car body, substantially as and for the purpose set forth.

Third, Arranging the seat of a car substantially in the manner and for the purpose described.

Fourth, The construction of a car or other wheeled vehicle with round or elliptic ends and ridges of sheet metal, d e e, angle iron and wood, combined in the manner and for the purpose herein described.

Fifth, The manner herein described of arranging the doors in combination with the shield or guard, for the purpose set forth.

38,508.—Tram and Level for Mills.—J. M. Seldomridge, Spring Valley, Ohio :

I claim the combination of the center screw, e, and radial slides, g g and e, for adjusting the instrument appropriately to the spindle, and the projecting arm, i, for the purpose described.

38,509.—Machine for punching Railroad Rails.—Alfred Sower and Martin Payne, Troy, N. Y. :

We claim the rollers, G, in the bed or bar, A, in connection with the two blocks, E E, having the punches, f, attached, all arranged for joint operation as and for the purpose herein set forth.

[This invention relates to a new and improved machine for punching railroad rails directly after being rolled and while in a heated state. The invention consists in the employment of rising and falling blocks provided with suitable punches, and operated through the medium of eccentrics and rollers, the blocks being provided with two punches each, so as to punch both sides of the rails at one operation, and the rails being placed on rollers which are operated simultaneously by means of belts, or their equivalents, all being arranged in such a manner that the rails may be punched expeditiously at both ends, and with less labor than the work can now be performed.]

38,510.—Corn Planter.—James H. Sorey, Xenia, Ill. Antedated Dec. 28, 1861.

I claim the combination and arrangement of the cams, H, grooves, Q, slide, I, spring, K, lever, L, slide, M, and points, N, constructed and operating together in the manner specified.

38,511.—Apparatus for Measuring and Weighing.—Nicholas Smith, Lansing, Iowa :

I claim a measure of capacity, B, fitted within a case, A, and having springs, D, one or more, applied to it, and also an index or indexes to travel over graduated plates, G, on the outer side of the case, all arranged substantially as and for the purpose herein set forth.

[This invention consists in the application of a weighing attachment to a measure of capacity (a half bushel, for instance), the parts being arranged in such a manner that grain or other articles may be measured and weighed simultaneously or separately, as desired.]

38,512.—Expanding Screw Tap.—William J. Stevens, Jersey City, N. J. :

I claim, as an improved article of manufacture, an expanding screw tap, made with a hollow body, A, mortises, h, nut-cutters, E, conical screw spindle, D, the nut, e, and screw-head, C, all as herein shown and described.

[The object of this invention is to provide, in a simpler manner than in the expanding taps heretofore constructed, for the setting-out and adjustment of the cutters; to this end it consists in a novel mode of combining a cone and adjusting screw with each other and with the body and head of the tap and the cutters.]

38,513.—Melting and Smelting Furnace.—James F. Stileman and Zabina Ellis, Philadelphia, Pa. :

We claim a box, I, of any convenient form with its opening, m, through which the slag is forced by the aid of the blast and tapping hole, h, the whole being applied to a foundry cupola or other furnace substantially as and for the purpose herein set forth.

38,514.—Harvester.—Daniel M. Swartz and Jonathan Kreamer, Millheim, Pa.:

We claim in combination with a horizontally revolving rake or reel that has also a rising and falling motion to accommodate itself to the platform and main frame, the frame, h, with its guides, i, for supporting and guiding the rear ends of the rake or reel stales or levers, substantially as and for the purpose described.

38,515.—Rake for Harvesting.—Philo Sylla, Elgin, Ill.:

I claim, first, Operating a rake for a harvesting machine, by means of two rotating cranks of unequal lengths, and both driven by a positive motion, substantially as and for the purpose set forth.

Second, I also claim the so combining with a rake shaft or handle, of two rotating cranks of unequal lengths, as that the said handle shall be united to and to move with the wrist pin of the short crank, whilst the wrist pin of the long crank traverses a slot or guide in or on said handle, thus causing one end of said handle to move in a true circle whilst the other end describes an irregular ellipse substantially as set forth.

Third, I also claim in combination with a rake driven by two rotating cranks, of unequal lengths having each a positive motion given to it, the setting of the crank shafts in a line oblique to the line of the finger bar, or cutting line of the machine substantially as and for the purpose set forth.

38,516.—Warp Brush.—Samuel Taylor, East Cambridge, Mass.:

I claim the employment or use in the manufactures of brushes of a concave plate, E, in combination with a flat plate or strip, F, for the purpose of holding the bristles while dipping them in pitch or other suitable cement, substantially as herein shown and described.

38,517.—Sink Trap.—Theodore B. Voorhees, New York City :

I claim in combination with the water-box of a sink, the valve bottom, F, attached to a shaft, G, or its equivalent, arranged substantially as shown, so that the valve bottom, F, will descend or tilt under a given weight of water in the box, and return to its original closed position when all over a given weight of water has escaped from the box.

I also claim the employment or use of the packing, J K, applied to the valve or bottom, F, of the box, E, and to the bottom edge of said box, for the purpose specified.

I further claim the lubricating arrangement, composed of the oil chamber, g, grooves, i i, in the shaft, G, and the tube, h, or its equivalent when combined and arranged with a sink to operate substantially as and for the purpose herein set forth.

[An illustration and description of this invention was published on page 305, current volume of the SCIENTIFIC AMERICAN.]

38,518.—Machine for making Bolts.—William E. Ward, Port Chester, N. Y.:

I claim in machinery for forming carriage and other like bolts from square rods of iron, forming the first set of grooves of the rolling dies, for a portion of their depth, with the sides square, that is, at right angles with the axis of the rollers, or nearly so, and having a mode of operation, such as herein described, in combination with other grooves of a semi-circular or other equivalent form for the after rollings, substantially as described.

I also claim the rolling dies with two or more sets of grooves substantially as described, in combination with a sliding and rotating mandrel with jaws, substantially as described, the two or more sets of grooves in the rolling dies acting in succession on each blank, the mandrel being turned for each successive rolling, as described.

I also claim in combination with the griping jaws on the mandrel the sliding stop, operated substantially as herein described, for forcing and holding the inner face of the head of the blank against the inner face of the griping jaws as described, and for the purpose specified.

I also claim the sliding shield plate, substantially as described, in combination with the rolling dies and the jaws on the mandrel, substantially as and for the purpose specified.

38,519.—Table Waiter or Tray.—Nathaniel Waterman, Boston, Mass.:

I claim the improved tray made substantially as described.

38,520.—Tool for cutting and beveling Barrel Heads.—William Watkins, Crete, Ill. Ante-dated Oct. 11, 1862 :

I claim the curved block, D, provided with the handle, B, and fitted with tooth, E, and knife, H, when used in combination with the slotted arm, C, and adjusting screw pivot, K, and operated in the manner and for the purpose set forth.

38,521.—Utilizing the Waste Heat of Puddling Furnaces &c., in generating Steam.—James Watt, Buffalo, N. Y.:

I claim the location of the boiler at the end of the furnace and on a horizontal plane therewith so that the surplus heat and slag from the furnace may be directed into a fire chamber, B', within the boiler, for the purpose and substantially as described.

38,522.—Apparatus for the Water Propulsion of Vessels.—James Watt, Buffalo, N. Y.:

I claim the application of the curb, B, and water-ways, C, to the stern of a boat or vessel in combination with a screw propellor for the purposes substantially as described.

38,523.—Incombustible Paper Shades for Lamps.—Gustav Wedekind, Philadelphia, Pa.:

I claim a paper shade, the whole interior surface of which is backed by mica, and the two layers of paper and mica are caught and held at the top and bottom thereof by a thin metallic strip or its equivalent, substantially as herein described and represented, and for the purpose described.

38,524.—Fastening Tire on Wheels.—Wm. C. Whiting & Henry F. Edwards, Worcester, Mass.:

We claim a metallic plate with any number of prongs on either or both ends introduced between the tire and felloe in the manner and for the purposes set forth.

38,525.—Process of finishing Leather.—Henry C. Williams, Lancaster, Pa.:

I claim the process of treating leather (after the same has been subjected to the operation of tanning) substantially in the manner and for the purpose set forth.

38,526.—Lubricator.—William W. W. Wood, Philadelphia. Pa. Ante-dated May 3, 1863 :

I claim the use, substantially in the manner described of the detachable siphon, E, in connection with an oil cup for the purpose set forth.

38,527.—Marine Camel.—Samuel Woolston, Vincentown, N. J.:

I claim, first, The above-described marine camel, having a spacious chamber, d above the main deck, substantially as set forth.

Second, In combination with the above I also claim the valves in the keel of the camel and the elevated pumps, the former for filling and the latter for emptying the chambers, substantially as described.

38,528.—Seeding Machine.—Nelson E. Allen (assignor to himself and Chas. B. Warren), Fox Lake, Wis.:

I claim, first, The spirally formed cups or pockets in the cylinders, E, in combination with oblique openings in the stationary caps, g, arranged to operate in the manner and for the purpose specified.

Second, The fluted cone or scatterer, J, attached to the tube, I 2, by an arm, S, and screw, i, so that it can be adjusted within the lower end of the tube, as and for the purposes specified.

Third, Suspending the bars, K, to which the cultivator teeth, j, are attached, from shaft, l, so as to have them project a sufficient distance in front of the shaft to form pedals by which either one of the cultivator teeth may be raised independently of the other, in the manner specified.

38,529.—Call for Telegraphs.—Alexander Bain (assignor to Wm. H. Allen), New York City. Ante-dated Dec. 11, 1862:

I claim the call composed of the reels of wire, B B, the permanent magnet, E, and the glass disk, G, or its equivalent; the whole combined, applied and arranged to operate substantially as and for the purpose herein specified.

38,530.—Key for Electric Telegraphs.—Alexander Bain (assignor to Wm. H. Allen), New York City. Antedated Dec. 11, 1862 :

I claim, first, Providing the lever of a telegraph key with a plug, p, of ivory or other surface of non-conducting material, operating with a sliding movement in combination with an elastic arm, l, or its equivalent, substantially as and for the purpose herein specified.

Second, In combination with the surface of insulating material, p, provided on the key and the arm, l, or its equivalent, I claim the cushions of soft material, f g, applied under the regulating screw and hammer or other stops of the key substantially as and for the purpose herein specified.

38,531.—Water Engine.—Abraham Coates & Martin V. Osborn (assignor to themselves and H. H. Babcock), Watertown, N. Y.:

I claim, first, The combination with the induction pipe of a water engine with the shifting valve, b, and with the air chamber of the auxiliary pipe, L, and valve, K, by which the concussion of the water upon the valve and piston is made to supply a portion of water to the air chamber substantially as and for the purpose set forth.

Second, The construction of the valve, b, of a single flat plate in combination with the conical or cylindrical heads or flanges, n n, substantially as set forth.

Third, The combination of the flat valve, b, with a water engine, substantially as set forth.

38,532.—Chain Hook.—George H. Draper (assignor to himself and Oscar M. Draper), North Attleboro, Mass.:

I claim the improved chain hook or connection as made with its shank and movable tongue scarfed together in manner, and secured by a rivet or pin, arranged with respect to the scarfing, substantially as described.

38,533.—Harvester.—Robert Glover, Grayville, Ill., assignor to himself and David Negley, White County, Ill.:

I claim the arrangement of main frame, A, supported on the single ground wheel, B, and double wheeled caster, C, the tongue, D, being hinged in line with the axis of the ground wheel, in the described connection with the finger bar, F, having a rolling drag bar, G, supported by arm, I, and brackets, H J, the whole being combined and adapted to operate, in the manner set forth.

38,534.—Power Loom.—Barton H. Jenks & John Shinn (assignor to Barton H. Jenks), Bridesburgh, Pa. Antedated Nov. 24, 1861 :

We claim, first, Making the lever, B, jointed as above described and for the purpose specified.

Second, We claim the raising cam, C, in combination with the moving pin, r, or its equivalent, for the above described purpose.

38,535.—Hand Stamp.—George J. Hill (assignor to Sanford, Harrun & Co.) Buffalo, N. Y.:

I claim the combination of a belt or strip of ink-prepared ribbon, with a bed for holding the "form" of types or plates and a stamping platen, the parts being so arranged that the ribbon may be run from spool to spool over the face of the type, and a succession of impressions printed without an inking apparatus, for the purposes and substantially as described.

38,536.—Closing Fruit Jars.—Carlton Newman (assignor to himself and Ephraim Wormser), Pittsburgh, Pa.:

I claim so constructing or shaping the upper part around the neck of self-sealing jars or cans, as that the shoulder of the jar shall incline gradually downwards from the circumference towards the neck in combination with the use of a cap or cover screwed or otherwise fastened over the neck of the jar, with an elastic gasket interposed between the base of the cap, and the shoulder of the jar, for the purpose of increasing the pressure on the gasket, between the shoulder of the jar, and the base of the cap or cover, as the jar contracts in cooling, substantially as hereinbefore described.

38,537.—Burner for Kerosene Lamps.—Timothy Raymond, Brooklyn, N. Y., assignor to himself and Samuel Dietz, New York City :

I claim the combination of the lever 2, and the spiral spring, 3, in the manner described, the parts being constructed, combined, and operating substantially as set forth.

38,538.—Machine for thrashing and cleaning Clover and Grass Seed.—Darwin Shattuck, Branchport, N. Y., assignor to himself and Alexander F. Whitaker, Penn Yan, N. Y.:

I claim, first, The conveyer, I, when made and used as specified.

Second, I claim the supports, M, for the concave, when made with the projections, and held by the bolts as specified and used for the purpose set forth.

Third, I claim the valve, N, when used in combination with the cylinder, K, and concave, L, to change the machine from thrashing and hulling to thrashing only without changing or stopping any other part of the machine.

38,539.—Adjustable Hanger.—Richard A. Stratton (assignor to himself and Charles H. Miller), Philadelphia, Pa.:

I claim the hanger with its cylindrical or semi-tubular stem, d, and its set-screws, B and G, in combination with the two portions, D and D', of the box, the latter portion having a plate, f, adapted to and rendered adjustable on the stem of the hanger, and the whole being constructed and arranged substantially as and for the purpose herein set forth.

38,540.—Purifying and bleaching Wax.—William Van Wyck (assignor to Elias W. Van Voorhis), New York City :

I claim the process herein described of purifying and bleaching wax, that is to say, first liquefying the wax, and while in that condition, submitting it in a filter to the action of bone-black or other suitable decoloring material.

38,541.—Anatomical Bit for Horses.—Henry T. Bomertre, Philadelphia, Pa.:

I claim first, The construction of the two check-pieces, conformable, or nearly so to the horses cheek-bones, nearly on line with the upper lips of the nostrils, so that by stress upon the reins connected with the bars, d d, pressure may be applied first to the cheek-bones for the ordinary control of the animal; or, in case of restive horses, a further pressure may be made upon the nostrils, all in the manner and for the purpose described.

Second, The straps, F and G, constructed and arranged as described in combination with the elastic cheek-pieces made to extend over the nostrils of the horse for the purpose of controlling by pressure the respiratory organs of the animal.

Third, The elastic cheek-pieces provided with the oblique or semi-circular slots, in combination with the lever bars, d d, constructed and arranged as described, and the bar, C, made rigid or elastic, whereby I am enabled to control the animal by pressure upon the cheek-bones, and eventually against the nostrils.

RE-ISSUES.

1,472.—Rake for Harvesters.—Walter A. Wood, Hoosick Falls, N. Y., assignee of John Richardson. Patented June 19, 1855 :

I claim in combination with a self-acting rake for harvesting machines, the crank-motion, the turning or rocking guide, and the long rake stale passing through said guide substantially as and for the purpose described.

DESIGNS.

1,759.—Metallic Plate for Burial Cases, &c.—Lucian Fay, Cincinnati, Ohio.

1,760.—Skate.—Eben T. Starr, New York City.

IMPORTANT TO INVENTORS

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THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts is promptly sent free of charge. Address MUNN & CO. No. 37 Park Row, New York.

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The service we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands such examinations have been made through this office. Address MUNN & CO., No. 37 Park Row, New York.

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HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank-bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

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cation for a patent is *reduced* from **$30** down to **$15**. Other changes in the fees are also made as follows —

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The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (but in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

During the last seventeen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the inventors throughout the country, we would state that we have acted as agents for at least TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees at home and abroad. Thousands of inventors for whom we have taken out patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the inventors whose patents were secured through this office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive offices, and we are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief story of the case, inclosing the official letters, &c.

Notes and Queries

T. M. McG., of N. Y.—You had better send for a boiler-maker and have him examine your furnace. He can tell better than we can, at this distance, what you require.

P. S., of Maine.—You should be very careful and have all the joints of your condenser air-tight. Take a lighted lamp and hold it up to suspected parts, and if the flame is forced in by the atmospheric pressure you may be sure that your vacuum will be impaired.

H. W., of Conn.—Albata is a name given to an alloy of nickel, and it is employed for making inferior tea-spoons, to imitate silver It is composed of copper, 15 parts; nickel, 5 parts; zinc, 5 parts.

H. W., of N. Y.—The amount of grate surface required in a boiler depends entirely upon the draft. In a locomotive, for six inches square of grate surface the evaporation is one cubic foot of water per hour—one horse-power. In stationary and marine engines one square foot of grate surface is allowed for each horse-power.

J. W., of N. Y.—All soaps are not suitable for washing. Lime water and olive oil form an insoluble soap totally unfit for washing purposes. A caustic alkali is necessary for the manufacture of washing soap; soda makes a hard and potash a soft soap with grease or oil.

G. A. F., of Ohio.—We have never heard that any European Government has offered a reward for the invention of an auger to bore a square hole.

Y. and A., of Cal.—Bound volumes of the SCIENTIFIC AMERICAN, if sent to you by mail, will cost three dollars per volume.

E. C. E., of Ohio.—We have carefully examined the sketch of your alleged improvement in projectiles, and it is a singular fact, that within the past three weeks we have received, from an American citizen in China, the same thing. We think well of the plan and should like to see it thoroughly tried.

S. L. M., of Conn.—We cannot tell you when wooden screws were first made in this country. They are extensively manufactured in Providence, R. I.

D. D. & Co., of Pa.—We do not sell the blind slat tenoning machine to which you refer. You had better write to S. C. Hill, No. 12 Platt street, this city, in regard to it. We do not deal in any kind of machinery.

J. B., of Pa.—Take your piston out and scrape the rings steam tight; that is better than to grind them in with emery. The latter substance gets in the pores of the iron and frequently ruins the cylinder.

F. D. D., of Ohio.—The old papers to which you refer will be of no value to us. In reference to marbleizing the front of the building to which you refer, we can furnish you with no receipt for preparing a stucco which shall imitate marble. The imitation is produced on the face of the stucco by the skillful use of paint. It needs a practiced hand to do it properly.

S. K. S., of Pa.—The Canadian Patent Bill to which we referred does not contemplate the granting of patents to those who have already secured them in this country. We fear the bill will not pass this season as Parliament is prorogued in consequence of the defeat of the ministry.

J. W., of Pa.—Picric acid is obtained by treating phenole with strong nitric acid. It is employed for dyeing yellow on silk, by first impregnating the silk with alum, then immersing it for a short period in a solution of the picric acid. An admixture of picric acid and indigo forms a beautiful green color on silk.

R. McC., of C. W.—Gutta-percha or india-rubber cement is well adapted for stopping leaks in the floors of piazzas, roofs, &c., but if you cover it with a coat of oil paint it will become soft and mix with the paint, as the oil dissolves the gutta-percha.

J. R. K., of Ohio.—We do not know what is the best known mode of swinging horses, but perhaps some of our readers may be able to inform you. We think such horses ought to be hung up by the neck. The cost of binding the SCIENTIFIC AMERICAN is 75 cents per volume.

T. H., of Pa.—Innumerable plans of aerial ships have been sent to us, which, like yours, we have not thought proper to notice. It will afford us pleasure to record the voyage of the first successful one—hoping it may be yours.

J. B. S., of Mass.—We have never seen the photograph of a cannon ball taken while in motion, but we have seen a great many such balls in the pictures of battle scenes. Great allowance must be made for the remarkable visionary powers of the artists who design such pictures.

S. V., of Mass.—The Bramah press is called the hydrostatic (not hydraulic) press, because it operates by the pressure of water.

C. H. C., of Conn.—Some Jonval turbine wheels have given out more power with the same quantity of water than overshot wheels. You will find full information respecting trials to test the power of turbine wheels on page 164, current volume of the SCIENTIFIC AMERICAN.

J. H. W., of Ohio.—Common hydraulic cement will stop the leaks in your aquarium; so will a cement of molten pitch.

A. H. N., of Ind.—If your patent does not cover all that you desire and have a right now to claim, you can surrender the original patent and obtain a re-issue. You cannot claim under an application for a re issue what is not already contained in your model in the Patent Office. Our pamphlet, a copy of which we will send you, explains the subject of re-issue.

R. M., of Ohio.—If you use Giffard's injector you will not require any feed-pump.

R. H. J., of Iowa.—If you have invented a convenient power which can be economically used for driving sewing machines, churn machines, washing machines, &c., we think it would find a ready sale, as such an apparatus is much wanted. In the absence of a suitable description of it, we can express no opinion respecting its merits.

M. P. & Co., of Conn.—The specimen of your mode of addressing newspapers seems to be an improvement over the method now in use for that purpose, and if the apparatus is simple it will meet approval. We shall be glad to see the machine in operation. The demand for labor-saving machinery of all kinds must be increased in proportion as men are drawn from industrial pursuits into the military service.

Money Received

At the Scientific American Office, on account of Patent Office business, from Wednesday, May 13, to Wednesday, May 20, 1863:—

L. B., of N. J., $25; V. D., of Pa., $50; J. A. & L. Van R., of N. Y., $36; T. O., of Mass., $100; G. R. J., of N. Y., $49; R. K., of Mass., $20; H. Van DeW.. of Mass., $20; D. D., of N. Y., $20; J. A. W., of Wis., $20; A. & W., of N. Y., $16; G. W. L., of N. J., $47; S. M. B. of N. Y., $16; A. J. G., of Mass., $39; M. H. S., of N. Y., $20; G. P. H., of N. Y., $20; J. B., of Ill., $16; J. H. A., of Mich., $15; S. D. G., of N. Y., $25; R. P. P., of N. J., $25; A. W., of N. Y., $100; G. H. F. of N. Y., $10, A. S., of Ill., $16; L. M., of N.Y., $20; M. & K., of Ill., $10; A. C., of Pa., $35; W. F., of Mo., $25; G. H. D., of N. Y., $15; L & W., of N. Y., $250; C. W. S., of N. Y., $250; O. P., of Vt., $25; E. H. J., of Ohio, $25; L. J., of France, $25; J. B., of N. Y., $29; J. J. D., of N. Y., $30; L. C., of N.Y., $28; H. U., of Conn., $20; T. H., of N. Y., $20; E. H., or Mass., $20; H. T., of N. J., $45; S. J. S., of N. Y., $20; R. Q., of N. Y., $41; A. H. P., of Iowa, $20; G. H. R., of N. Y., $16; R. & W. K., of Mass., $44; H. W. B., of Ohio, $63; M. A. D., of Mich., $20; A. & S., of N. Y., $10; A. B., of Vt., $16; M. M. & Co., of Ind., $30; G.M., of N.H., $25; J. McC., of N.Y., $28; J.W. K., of Mass., $16; T. W., of Mass., $30; F. W. H., of Canada, $250; E, G. H., of Mass., $16; W. N., of N. Y., $29; J. G., of R. I., $25; E. C. B., of Cal., $50; M. A. J., of Mass., $16; J. B. R., of N. Y., $300; G. & T., of N. Y., $373; W. B. R., of Mich., $16; H. W., of N. Y., $25; E. A., of N. J., $35; L. B., of N. Y., $25; A. P. T., of N. Y., $45; W. M., of N. Y., $16; G. L. T., of Mass., $10; A. C., of Cal., $16; G. G., of Ill., $20; D. L. D., of N. Y., $16; W. K. L., of Mass., $20; H. & S., of Pa., $20; T. R. T., of N. Y., $16; W. P., of N. Y., $16; V. & W., of Wis., $20; G. T., of N. Y., $16; A. W., of Iowa, $16; G. H. M., of Ind., $15; S F. L., of Wis., $20; S. M. & Bros., of Pa., $20; A. S. L., of N. Y., $372; C. R., of Mich., $15; G. L., of N. J., $25; D. R., of N. Y., $25; J. & J., of Mich., $16; A. C. T., of N. Y., $25; A. J. A., of Ill., $16; J. V. D., & Co., of Va., $25; Z. S., of Wis., $30; G. R. B., of R. I., $16; E. P. H., of Mass., $16; B. L., of Vt., $25.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Wednesday, May 13, to Wednesday, May 20, 1863:—

L. B., of N. J.; J. B., of N. Y.; E. A., of N. Y.; V. D., of Pa. (2 cases); J. J. D., of N. Y.; L. B., of N. Y.; J. A. & L. Van R., of N. Y.; L. C., of N. Y.; B. and B., of N. Y.; R. Q., of N. Y.; R. and W. K., of Mass.; A. J. G., of Mass.; O. P., of Vt.; H. and R., of Ohio; J. G., of R. I.; T. and S., of N. Y.; W. F., of Mo.; O. N., of N. Y.; G. H., of N. Y.; E. H. J., of Ill.; J. and S., of Wis.; A. C., of Pa.; J. C., of Ohio; J. D. P., of N. J.; G. M., of N. H.; S. F. L., of Wis.; S. G., of N. Y.; J. McC., of N. Y.; D. M., of Ind.; H. W., of N. Y.; G. L., of N. J.; L. J., of France; B. L., of Vt.; M. and K., of Ill.; T W., of Mass.; D. R., of N. Y.

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GENERAL ORDERS, NO. 105.

WAR DEPARTMENT,
ADJUTANT GENERAL'S OFFICE,
WASHINGTON, April 28, 1863.

The organization of an Invalid Corps is hereby authorized.

This Corps shall consist of Companies, and, if it shall hereafter be thought best, of Battalions.

The Companies shall be made up from the following sources, viz.:

First, By taking those officers and enlisted men of commands now in the field (whether actually present or temporarily absent) who, from wounds received in action or disease contracted in the line of duty, are unfit for field service, but are still capable of effective garrison duty, or such other light duty as may be required of an Invalid Corps. Regimental Commanders shall at once make out, from information received from their Medical and Company Officers, and and from their own knowledge, rolls (according to the Form furnished) of the names of all the officers and enlisted men under their commands who fulfill the following conditions, viz.:

1. That they are unfit for active field service on account of wounds or disease contracted in the line of duty: this fact being certified by a Medical Officer in the service, after personal examination.

2. That they are fit for garrison duty: this fact being likewise certified by the Medical Officer, as above, after personal examination.

3. That they are, in the opinion of their Commanding Officers, meritorious and deserving.

These rolls shall be certified by the Examining Surgeon and Regimental Commander, and transmitted, through the regular channels of military correspondence, to the Provost Marshal General of the United States.

The Regimental Commander shall enter in the column of remarks opposite each officer's name on the roll, a statement as to the general character of the officer for intelligence, industry, sobriety and attention to duty; and all intermediate Commanders shall endorse thereon such facts as they may possess in the case, or, if they have none, they shall state how far they are willing to endorse the opinion of the officer or officers making the recommendation. Similar rolls shall be forwarded from time to time, whenever the number of men fulfilling the conditions enumerated or the exigencies of the service may render it expedient.

Second, By taking those officers and enlisted men still in the service and borne on the rolls, but who are absent from duty, in Hospitals or Convalescent Camps, or are otherwise under the control of Medical Officers. In these cases the Medical Officer in attendance shall prepare the rolls according to Form, entering the names of officers and men from the same Regiment on a roll by themselves, and send them, with the certificate of the Surgeon duly signed, to the proper Regimental Commander, who will forward them, as heretofore specified, subject to the same conditions and requirements. If, in any case, the Regimental Commander shall think an officer unfit, in point of character to continue in the service of the Invalid Corps, though disabled and certified by the Surgeon, he will state his objection in the column of remarks, and note the exception before signing the certificate. If any officer or enlisted man now in the service, but absent and beyond the reach of a Medical Officer in charge of a Hospital or Convalescent Camp, desires to enter this Corps, he will take the course indicated below for those who have been honorably discharged from the service.

Third, By accepting those officers and enlisted men who have been honorably discharged on account of wounds or disease contracted in the line of duty, and who desire to re-enter the service. In the case of an officer, application for appointment must be made to the Provost Marshal General of the United States through the officer detailed as Acting Assistant Provost Marshal General of the State. No application of this kind will be considered unless the following conditions are completely fulfilled:—

1. That the applicant produce the certificate of the Surgeon of the Board of Enrollment for the District in which he resides, that he is unfit for active field duty on account of wounds or disease, and is not liable to draft, but is fit for garrison duty.

2 That he furnish evidence of an honorable discharge on account of wounds or disability contracted in the line of duty.

3. That he produce recommendations from the Regimental, Brigade and Division Commanders under whom he formerly served, that he is worthy of being again provided for and capable of returning adequate service to the Government. In case it shall be impracticable to get this last evidence, he may, having established the first two points above, satisfy the Board of Enrollment that he is deserving, and present its certificate of the fact. This evidence must all be obtained by the applicant, and must be transmitted with his application for appointment.

If there be no Acting Assistant Provost Marshal General for the State, the application may be forwarded through the Adjutant General of the State, who is desired to endorse thereon such facts in the military history of the applicant as he may know, or as are afforded by his records, and forward the same to the Provost Marshal General of the United States. Enlisted men, honorably discharged on account of disability, desiring to re-enlist in this Corps, will present themselves to the Board of Enrollment for the District in which they reside, for examination by the Surgeon thereof, who shall examine them and report the result to the Board of Enrollment.

The Board shall then consider each case, and if the applicant is found to fulfill the conditions specified below, the Board shall give him a certificate to that effect, viz.:

1. That he is unfit for service in the field.
2. That he is fit for garrison duty.
3. That he is meritorious and deserving.
4. That he was honorably discharged from the service.

The Provost Marshal for the District shall then send the application, with this certificate of the Board, to the Acting Assistant Provost Marshal General of the State, who shall procure such evidence of service and character as the records of the Company to which he belonged, on file at the Headquarters of the State, may show, and if satisfied that it is a meritorious case, and that the man is deserving, he will enlist him in accordance with such special rules as the Provost Marshal General may establish.

Medical Inspectors, Surgeons in charge of Hospitals, Military Commanders, and all others having authority to discharge, under existing laws and regulations, are forbidden to grant discharges to any men under their control who my be fit for service in the Invalid Corps.

The Provost Marshal General is charged with the execution of this order, and the troops organized under it will be under the control of his Bureau.

By order of the Secretary of War:

E. D. TOWNSEND,
Assistant Adjutant General,

21 4

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A VALUABLE WORK FOR INVENTORS, PATENTEES AND MANUFACTURERS.

The publishers of the SCIENTIFIC AMERICAN have just prepared, with much care, a pamphlet of information about Patents and the Patent Laws, which ought to be in the hands of every inventor and patentee, and also of manufacturers who use patented inventions. The character of this useful work will be better understood after reading the following synopsis of its contents:—

The complete Patent Law Amendment Act of 1861—Practical Instructions to Inventors, how to obtain Letters Patent, also about Models—Designs—Caveats—Trade-marks—Assignments—Revenue Tax—Extensions—Interferences—Infringements—Appeals—Re-issues of Defective Patents—Validity of Patents—Abandonment of Inventions—Best Mode of Introducing them—Importance of the Specification—Who are entitled to Patents—What will prevent the Granting of a Patent—Patents in Canada and European Patents—Schedule of Patent Fees; also a variety of miscellaneous items on patent law questions.

It has been the design of the publishers to not only furnish, in convenient form for preservation, a synopsis of the PATENT LAW and PRACTICE, but also to answer a great variety of questions which have been put to them from time to time during their practice of upwards of *seventeen years*, which replies are not accessible in any other form. The publishers will promptly forward the pamphlet by mail, on receipt of six cents in postage stamps.

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BUREAU OF ORDNANCE.

NAVY DEPARTMENT,
Washington City, April 1, 1863.

This Bureau is desirous of ascertaining whether rifled cannon can be made of wrought iron of sufficient and uniform endurance and economy to warrant their being preferred to guns of cast iron only, or of cast iron steel-faced with wrought iron.

Proposals will therefore be received from any manufacturers of forged iron, to furnish a finished gun, or a block of metal from which the same may be finished.

The said gun, when finished, to weigh about 10,000 pounds, to be made into a gun throwing a projectile of 100 pounds, as used in cast iron rifled cannon of like weigh, to be fired 1,000 times with service charges of the same weight and kind of powder as used in the Parrott 100-pounder, viz: 10 pounds of No. 7, without bursting or wearing in such a manner as to cause apprehensions of bursting.

The quality of metal, price, and other terms, are to be stated clearly in the proposals forwarded.

The Bureau reserves the right to itself of accepting or rejecting any of the proposals.

The time for receiving the proposals is limited to sixty days from date; and proposals will only be received from persons actually engaged in the fabrication of wrought iron.

JOHN A. DAHLGREN, Chief of Bureau.

15 8

RAILROAD IRON FOR SALE.

UNITED STATES MILITARY RAILROAD OFFICE,
250 G STREET, WASHINGTON, D. C., May 12, 1863.

The undersigned will receive bids for the purchase of 938 920 2240 tuns new railroad iron, weighing 60 lbs. to the yard. 266 720-2240 tuns of the above is at the Cambria Mills, Johnstown, Pa., and the balance —672 200-2240 tuns—at Pittsburgh, Pa.

In case a bid is accepted, the party making the same will be notified as soon as practicable. If within ten days the party shall fail to make payment, in Government funds, to the undersigned, the iron for which such bid was made will be subject to sale to any other person.

The right to reject any and all bids is expressly reserved. All bids must be sealed and forwarded to the undersigned at Washington, D.C., and endorsed "Bid for Railroad Iron." Bids will be received, as above invited, until June 5th, at which time a decision will be given.

21 3 H. L. ROBINSON, Captain and A. Q. M.

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NERVOUS DISEASES AND PHYSICAL DEBILITY, arising from Specific causes, in both sexes—new and reliable treatment, in Reports of the Howard Association—sent in sealed letter envelopes, free of charge. Address Dr. J. SKILLIN HOUGHTON, Howard Association, No. 2 South Ninth street, Philadelphia, Pa. 20 4*

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INVENTORS AND CONSTRUCTORS OF NEW AND useful Contrivances or Machines, of whatever kind, can have their Inventions illustrated and described in the columns of the SCIENTIFIC AMERICAN on payment of a reasonable charge for the engraving.

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Die Unterzeichneten haben eine Anleitung, die Erfindern das Verhalten angibt, um sich ihre Patente zu sichern, herausgegeben, und verabfolgen solche gratis an dieselben.

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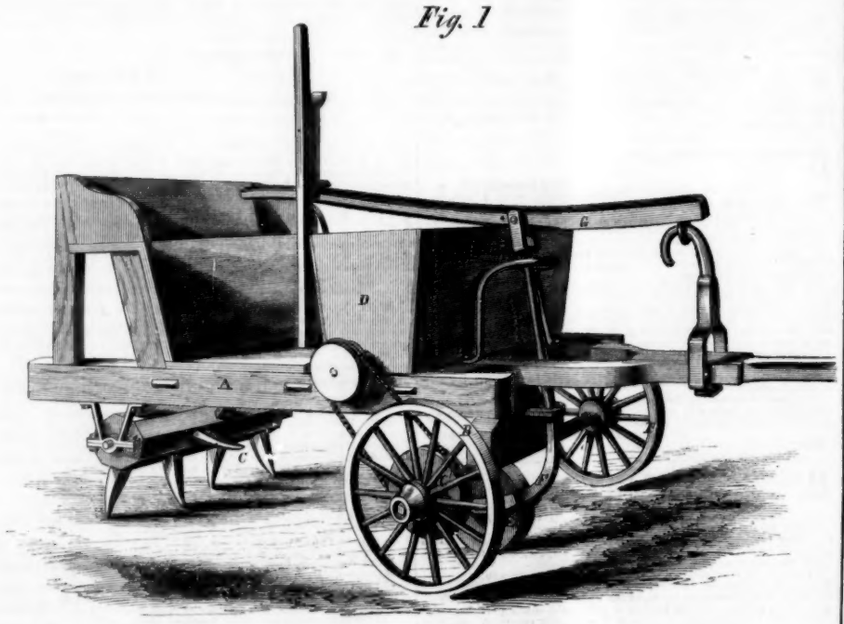
Improved Seed Drill.

Herewith we illustrate a novel, and it would appear, an effective seeding machine. It consists of the frame, A, supported on the wheels, B, and the cultivator teeth, C, behind. The main axle forward has a pulley, C', on it, which carries a band passing over the seeding apparatus contained in the box, D. At E may be seen a pulley attached to the goose-neck, F, and connected with the lever, G, by forked jaws. Fig. 2, shows the arrangement of the seeding device which is as follows: The box, D, is provided internally with another one, H, in which the seed is

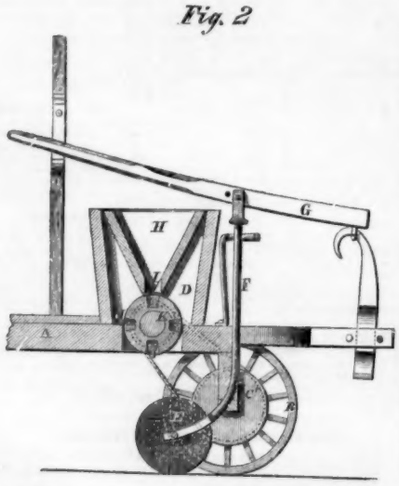
Fig. 1



UNDERWOOD'S PATENT SEED DRILL.

contained. In the bottom of this box there are three square openings, I, which communicate with the seed cells, J, in the cylinder, K. The operation is as follows: When the team is started, the seeding cylinder revolves by the action of the belt upon it; as each cell passes the aperture, a certain quantity of grain falls into it which is deposited on the ground as the machine advances. The cultivator teeth following behind, cover the seed in. When

Fig. 2



the machine turns a corner at the end of the field, the seeding device is thrown out of gear by the lever, G. By bearing down upon the end near the driver the weight of the machine is thrown on the wheel, E, and the machine can then be turned around and another row planted. The teeth may be of any desired form. In the engraving the machine is shown ready to turn.

The inventor has—far more graphically than we could do it—spoken in the following terms of the popularity of his machine, and we propose to let him tell his story in his own way:—

"Allow me to tender to you my sincere thanks for the able, skillful, and honest manner in which you conducted my business with the Patent Office. You have made for me a fortune which without your aid, would doubtless never have been realized. I shall not fail to recommend your most excellent paper, the Scientific American, to all with whom I associate, and I would direct every poor disappointed inventor to your Agency as the star of his hope. I have two other cases, which I shall send to you soon. My machine takes like 'hot cakes' wherever it has been introduced."

This invention was patented on Oct. 21, 1862; further information may be had by addressing the patentee, J. A. Underwood, Oskaloosa, Iowa.

The Great West.

In the last ten years there have been built at the West 3,656 miles of railroad, at a cost of $254,720,364, mostly by Eastern or imported capital. The Illinois Central Railroad Company alone sent into Illinois $30,000,000, and built a road which enabled the Federal Government to sell $11,000,000 worth of land, and the company to sell $20,000,000 more to actual settlers, making over $61,000,000 concentrated in that State by the operations of one company. The chief effect of this has been to swell the aggregate receipts of grain at Chicago, during the ten years to 158,544,554 bushels, which, at an average price of 66 cents per bushel (the value for 1860 at Chicago), would be worth $126,000,000, thus exceeding by $31,000,000 the cost of the railroads, through the agency of which the grain was made available. In 1861 the quantity of grain increased to 47,697,409 bushels; the Southern route being closed, and in 1862 the amount was 60,150,390 bushels. These figures but indicate the extent of that prosperity which has developed so rapidly during the last ten years in the northern sections of the West.

Current Rates of Wages.

The exorbitant prices of food and all the necessaries of life have caused a corresponding advance in the amount of wages paid to the working classes. Very many strikes and combinations have taken place and are still going forward, urged by all the zeal which the malcontents possess. We are not of those who foresee any special permanent advantages likely to accrue to Workingmen's Societies as they have always been conducted in this country; but we hope sincerely that all who are in want will have their necessities looked into and their demands complied with, provided that they are not unreasonable. Machinists in this city are now receiving from 30 to 50 cents more per day than before the inflated prices of living came in. Blacksmiths are receiving from 40 to 60 cents more per day; boiler-makers the same; ship-carpenters about the same, and in fact nearly every trade has had its standard of pay much increased of late, as is right and proper under the circumstances.

W. H. Goodhue, U. S. Vice Consul at Zanzibar, reports that the expedition of Captains Speke and Grant, in search of the sources of the Nile, has resulted in the discovery of the Mirerango river—the first certain leading branch of the Nile—which takes its rise in Lake Victoria Majanza, a lake discovered by Captain Speke while engaged in another expedition of African discovery a few years since.

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The SCIENTIFIC AMERICAN will be found a most useful journal to them. All the new discoveries in the science of chemistry are given in its columns, and the interests of the architect and carpenter are not overlooked; all the new inventions and discoveries appertaining to those pursuits being published from week to week. Useful and practical information pertaining to the interests of millwrights and millowners will be found published in the Scientific American, which information they cannot possibly obtain from any other source. Subjects in which planters and farmers are interested will be found discussed in the Scientific American; most of the improvements in agricultural implements being illustrated in its columns.

To the Inventor!

The SCIENTIFIC AMERICAN is indispensable to every inventor as it not only contains illustrated descriptions of nearly all the best inventions as they come, but each number contains an Official List of the Claims of all the Patents issued from the United States Patent Office during the week previous; thus giving a correct history of the progress of inventions in this country. We are also receiving, every week, the best scientific journals of Great Britain, France and Germany; thus placing in our possession all that is transpiring in mechanical science and art in those old countries. We shall continue to transfer to our columns copious extracts from those journals of whatever we may deem of interest to our readers.

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